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THE MIND AND ITS EDUCATION

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BY

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PREFACE

THIS book is intended as an introduction to psychology for teachers, both in their private study and their Reading Circle classes, for students in secondary schools, normal schools or colleges, and for general readers. Its appearance is an immediate outgrowth of various courses of lectures on psychology and education given to classes of teachers and elementary students in education. More remotely, it owes its origin to a suggestion received from Prof. John Dewey when the writer was a student in his classes. Said Professor Dewey: "The teacher is equally under the necessity of knowing each of the two factors in the educational process—*culture* and the *child*; that is, *subject-matter* and *psychology*—not the technicalities and controversial points of psychology, but its broad and fundamental truths, upon which practically all are agreed, and which, fortunately, are simple and easily understood." This statement furnishes the standpoint, in the following pages, for both subject-matter and method of treatment.

First, the attempt has been made to present only *fundamental* truths, which, let us be thankful, are but little subject to controversy. No space has been devoted to the controversial, speculative, or hypothetical questions which are

vexing the soul of the advanced student of psychology. Considerable emphasis has been placed on the physiological processes which accompany our mental life, but always for the purpose of throwing light on our mental processes and without losing sight of the fact that the discussion has to do primarily with psychology rather than with physiology.

Second, the aim has been to state these fundamental truths *simply*, that the student may clearly understand them; and also to state them *attractively*, that he may cultivate the desire for reading them. These two considerations have had much to do with determining the style and method of treatment. The more popular, if less literary, lecture style has been used in preference to the essay style. This was done because of the eagerness with which young students, who are afraid of the average work on psychology, will seize upon the very same subject-matter when it is stripped of all unnecessary abstruseness, and presented with a sufficient amount of illustration to clothe the skeleton of dry facts with something of vitality.

Third, it is recognized that if the student is really *to make use of* the psychology he learns, he must have practical and useful truths presented to him, and must be led to a comprehension of these truths through their relation to his own actual experience. This criterion dictates that the subject-matter presented shall be of such a nature that its counterpart can be found in the experience of the student, and discovered by him through the process of introspection; that the psychological truths and laws discovered must find application in acquiring new experience—that is, in

education; that the psychology must be applied, or better, it must be studied with the individual student himself as its center and subject, so that the application is never separated from the process of its discovery.

The foregoing views account for the fact that the text is much more descriptive than explanatory; that a constant appeal is made to the experience of the student to verify the statements of the text; that the matter presented is so largely concrete and so little abstract; that the application of psychological truths and laws is continually made to development and education.

The various exercises suggested at the ends of the chapters will be found useful not because they outline the respective chapters in any systematic way, but because they will encourage *introspection,* without which psychology may be committed to memory but can never become a directive factor in education. The reading references will be serviceable to the student who desires to pursue the subject beyond the scope of this book.

My colleague, Prof. John E. Stout, has rendered valuable assistance in the preparation of the manuscript for this book, for which grateful acknowledgment is given.

Cornell College, Mount Vernon, Iowa,
February, 1906.

CONTENTS

CHAPTER I

THE MIND, OR CONSCIOUSNESS

PAGE

How we may come to know the mind.—The personal character of consciousness.—Where the mind resides.—The means by which each may study his own mind; introspection.—The mental processes revealed by introspection.—Consciousness likened to a stream; points of resemblance.—The wave in the stream; attention.—The contents of the stream.—The three modes of activity in which consciousness manifests itself: knowing, feeling, willing 1

CHAPTER II

ATTENTION

The nature of attention.—Some degree of attention present at all times.—The effects of attention; increase of efficiency through concentration.—How we attend.—Types of inattention.—Cultivation of attention.—How attention is secured; involuntary attention, nonvoluntary attention, voluntary attention.—Interest and nonvoluntary attention.—The will and voluntary attention.—Interrelation of the two types of attention.—The habit of attention 12

CHAPTER III

THE BRAIN AND NERVOUS SYSTEM

The mind and the brain.—The nervous system the machine through which the mind works.—The structure of the nervous system.—The neuron.—The central nervous system; brain and cord.—The peripheral nervous system; end organs.—

PAGE

Division of labor in the nervous system; sensory and motor functions.—The end organs and the external world.—Dependence of the mind on the senses for its material . . . 25

CHAPTER IV

SENSORY AND MOTOR TRAINING

Education dependent on both body and mind.—Efficiency of nervous system resting largely on development and nutrition.—Undeveloped potentialities of our nervous systems.—Development through varied stimuli and untrammeled response.—The factors involved in a simple act.—Application to education.—The effect of fatigue and malnutrition.—Factors involved in good nutrition.—Necessity for sleep and freedom from worry and overfatigue 43

CHAPTER V

HABIT

The part which habit plays in our life.—Habit a method of economy.—Physical habits.—Mental habits.—Our powerlessness to prevent habits from forming.—The physical basis of habit; our nervous system an automatic register of our acts.—Control of our habits through our acts.—The part of habit in education.—Youth the time of habit-forming.—The value of certain habits.—Danger even in good habits.—Maxims for habit-forming 56

CHAPTER VI

SENSATION AND PERCEPTION

The constant appeal made to the mind by our environment.—The mind constructing its world of material objects from these stimuli.—How thought reaches beyond the knowledge of the senses.—The senses working together in a copartnership.—The sensory processes; interaction of stimulus and nervous mechanism.—The qualities which we usually ascribe to objects really existent in the mind.—The problem which confronts the child; how he proceeds.—Our problem and process the same.

PAGE

—How perception of objects and of space is accomplished.—Sensation and perception the basis for our thought structure.—Necessity of entering largely into the world of our material environment 70

CHAPTER VII

MENTAL IMAGERY

All present thinking dependent on past experience.—How the past interprets the present and future.—How past experience is conserved: on the physical side by habit, on the mental side in images.—The study of our mental images through introspection.—Galton's test of imagery.—The value of a wide range of imagery.—The use of imagery in the interpretation of literature and other studies.—Development of the power of imagery.—Application to education 90

CHAPTER VIII

MEMORY

The nature of memory.—Its physical basis.—Retention and recall dependent on neural plasticity and activity.—Individual differences in brains.—Images the material of memory.—Types of memory.—The laws of memory.—Association; its laws inexorable.—The necessity for right thinking.—What constitutes a good memory.—Improvement of the memory; physiological conditions; methods of recording facts.—The misuse of mnemonic devices 107

CHAPTER IX

IMAGINATION

The test of a good imagination; various standards.—Necessity for different types of imagination.—The use of imagination in interpreting the thought of others; in our own thinking.—Some practical applications: in science; in the arts; in the humdrum of every-day life; in conduct; in building ideals.—Imagination limited (1) by material available in form of images, (2) by constructive ability, (3) by definite purpose.—Abuse of the imagination.—Cultivation of the imagination . 128

CHAPTER X

THINKING

PAGE

Interdependence of physical and mental objects.—The function of thinking, to discover relations.—The thinking of the child and that of the adult.—The necessity for classification in our knowledge.—How this is accomplished through thinking.—The nature and formation of the concept.—The necessity for good concepts.—Judgment, its forms and uses.—Reasoning.—How we proceed in reasoning.—Its types, and how they are related.—The necessity for broad inductions.—The syllogism and its use.—Cultivation of thinking 143

CHAPTER XI

INSTINCT

The influence of heredity in our lives.—Instinct the result of race experience.—The function of instinct.—Through instinct the habits of the race inherited by the individual.—How instincts are modified through education and made into individual habits.—The ripening of instincts.—Transitoriness of instincts.—The human instincts of imitation, fear, and play . . 161

CHAPTER XII

FEEL NG AND ITS FUNCTION

The importance of feeling as a motive.—Definition.—Feeling an accompaniment of all mental processes.—The qualities of feeling.—Feeling tone, or mood; how produced, and its influence.—How our dispositions are formed; the part played by temperament.—The nature and growth of our sentiments; their force as motives 182

CHAPTER XIII

INTEREST

Interest a selective agency among our activities.—Its influence in directing our stream of thought.—The nature of interest; relation to a subjective scale of values.—Objective side of interest.—The dynamic phase of interest.—Immediate and remote interests, and the part they play as motives.—Transitory in-

PAGE

terests.—The necessity for making a selection among our interests.—Danger of early specialization in our interests.—Interest and the will.—Interest and character 195

CHAPTER XIV

THE EMOTIONS

The relation of instinct and emotion.—Emotion and the physical response.—Physiological explanation of emotion.—The control of our emotions.—Dependence of emotion on expression.—Growing tendency toward emotional control.—A desirable emotional balance.—The emotions and enjoyment.—The emotions as motives.—Cultivation of the emotions.—Danger from overwrought emotions, and from arousing the emotions without giving opportunity for expression.—Emotional habits . 212

CHAPTER XV

THE WILL

The function of the will: concerning itself wholly with causing or inhibiting acts.—Various types of action; physiological reflexes; instinctive acts; ideo-motor acts; deliberative acts.—Volitional acts preceded by nonvolitional.—The image and the act.—The process of deliberation.—The emotional factor in decision.—Types of decision.—The final test of power measured in attention.—Types of will.—Training of the will in the common duties of daily life.—The freedom of the will . 226

CHAPTER XVI

SELF-EXPRESSION AND DEVELOPMENT

Interrelation of impression and expression.—The many sources of impressions.—The various forms of expression.—The necessity for cultivating expression.—The intellectual value of expression.—The moral value.—The religious value.—The social value.—The educational value.—Expression in the home and in the schools.—Expression as related to character . . 246

INDEX 259

CHAPTER I

THE MIND, OR CONSCIOUSNESS

How mind is to be known.

THE mind and its education. But how are we to discover the nature of the mind, or know the processes by which it works? For mind is not something that can be seen or felt or weighed. You and I may look into each other's face and there read something of the mind's activity, but neither can discover the real *you* of the other. I may learn to recognize your features, to know your voice, to respond to the clasp of your hand; but the *mind,* or *consciousness,* which does your thinking, and feels your joys and sorrows, I can never know completely —indeed can never know at all except through your various acts and bodily expressions. Nor can you in any way reveal yourself to me except through these means.

The personal character of consciousness.

Between your consciousness and mine there exists a wide gap, which cannot be bridged no matter how well we become acquainted with each other. We may work together, live together, come to love or hate each other even, and yet our inmost selves forever stand apart. Only *you* can ever know *you,* and only *I* can ever know *I* in any intimate and first-hand way. When I consider how you must think or feel or act under certain circumstances, I am really but interpreting my own thoughts and feelings and actions under similar circumstances, and attributing them to

you. I must always judge you in terms of myself or else not at all.

Where the mind resides.

I dwell somewhere in this body, but where? When my finger tips touch the object I wish to examine, I seem to be in them. When the brain grows weary from overstudy, I seem to be in it. When the heart throbs, the breath comes quick, and the muscles grow tense from noble resolve or strong emotion, I seem to be in them all. When, filled with the buoyant life of vigorous youth, every fiber and nerve is a-tingle with health and enthusiasm, I live in every part of my marvelous body. Small wonder that the ancients located the soul at one time in the heart, at another in the pineal gland of the brain, and at another made it coextensive with the body!

Later science has taught that the *mind resides in and works through the nervous system, which has its central office in the brain.* And the reason why *I* seem to be in every part of my body is because the nervous system extends to every part, carrying messages of sight or sound or touch to the brain, and bearing in return orders for movements, which set the feet a-dancing or the fingers a-tingling. But more of this later.

Introspection the means of studying our own minds.

What is the mind? What is that which we call consciousness? No definition can ever make it clearer than it is now to each one of us. And, indeed, if I were to attempt to define mind or consciousness, from any immediate knowledge of it, I should have to define *my* mind and not *mind.* The only mind which I have ever known, or can know, is my own; and the only one which you have ever known, or can know, is yours. It is true that I may judge something of the working of your mind from the fact that you

seem to act, think, love and hate, deliberate and decide, much as I do; but yet I judge these things concerning your mind because I have experienced them in my own. Thus it follows that the only way to know what mind is, is to look in upon our own consciousness and observe what is transpiring there, or, in the language of the psychologist, to *introspect.* For you can never come to understand the workings of your mind from listening to lectures or studying books alone. These may show you what to look for and expect, but every statement must be tested by your own experience before you can understand its meaning. In order to introspect you must catch yourself in the act of thinking, of remembering, of loving, of deciding, and all the rest, and observe what it is that is going on. This is not so easy as it appears; for the moment we turn to look in upon the mind, that moment it changes, and the thing we meant to examine is gone, and something else has taken its place. All that is left to us then is to view the mental object while it is still fresh in the memory, or to catch it again when it returns.

Introspection cannot reveal what the mind is.

Nor are we to be discouraged if, even by introspection, we cannot discover precisely *what* the mind is. No one knows what electricity is, though nearly everyone uses it in one form or another. We study the dynamo, the motor, and the conductors through which electricity manifests itself. We observe its effects in light, heat, and mechanical power, and so learn the laws which govern its operations. But we are almost as far from understanding its true nature as were the ancients who knew nothing of its uses. The dynamo does not create the electricity, but only furnishes the conditions which make it possible for elec-

tricity to manifest itself in doing the world's work. Likewise the brain or nervous system does not create the mind, but it furnishes the machine through which the mind works. We may study the nervous system and learn something of the conditions and limitations under which the mind operates, but this is not studying the mind itself. As in the case of electricity, what we know about the mind we must learn through the activities in which it manifests itself—these we can know, for they are in the experience of all. It is, then, only by studying these processes of consciousness that we come to know the laws which govern the mind and its development. *What* it is that thinks and feels and wills in us is too hard a problem for us here—indeed, has been too hard a problem for the philosophers through the ages. But the thinking and feeling and willing we can watch as they occur, and hence come to know.

But it can discover the process of its working.

In looking in upon the mind we must expect to discover, then, not a *thing,* but a *process.* The *thing* forever eludes us, but the process is always present. Consciousness is like a stream, which, so far as we are concerned with it in a psychological discussion, has its rise at the cradle and its end at the grave. It

Nature of the process—a stream.

begins with the babe's first faint gropings after light in his new world as he enters it, and ends with the man's last blind gropings after light in his old world as he leaves it. The stream is very narrow at first, only as wide as the few sensations which come to the babe when it sees the light or hears the sound; it grows wider as the mind develops, and is at last measured by the grand sum total of life's experience.

This mental stream is irresistible. No power outside of us can stop it while life lasts. We cannot stop it

ourselves. When we try to stop thinking, the stream but changes its direction and flows on. While we wake and while we sleep, while we are unconscious under an anæsthetic, even, some sort of mental process continues. Sometimes the stream flows slowly, and our thoughts lag—we "feel slow"; again the stream flows faster, and we are lively and our thoughts come with a rush; or a fever seizes us and delirium comes on; then the stream runs wildly onward, defying our control, and a mad jargon of thoughts takes the place of our usual orderly array. In different persons, also, the mental stream moves at different rates, some minds being naturally slow moving and some naturally quick in their operations.

Points of resemblance to a stream.

Consciousness resembles a stream also in other particulars. A stream is an unbroken whole from its source to its mouth, and an observer stationed at one point cannot see all of it at once. He sees but the one little section which happens to be passing his station point at the time. The current may look much the same from moment to moment, but the component particles which constitute the stream are constantly changing. So it is with our thought. Its stream is continuous from birth till death, but we cannot see any considerable portion of it at one time. When we turn about quickly and look in upon our minds, we see but the little section of consciousness which occupies the present moment. That of a few seconds ago is gone and will never return. The thought which occupied us a moment since can no more be recalled, just as it was, than can the particles composing a stream be re-collected and made to pass a given point in its course in precisely the same order and relation to one another as before. This means, then, that we

can never have precisely the same mental state twice; that the same thought never comes to us a second time with just the same associates that it had the first time; that the thought of this moment will never be ours again; that all we can know of our minds at any one time is the part of the process present in consciousness at that moment.

The wave in the stream of consciousness.

The surface of our mental stream is not level, but is broken by a wave which stands above the rest; which is but another way of saying that some one thing is always more prominent in our thought than the rest. Only when we are in a sleepy reverie, or not thinking about much of anything, does the stream approximate a level. At all other times some one object occupies the highest point in our thought, to

Fig. 1.

the more or less complete exclusion of other things which we might think about. A thousand and one objects are possible to our thought at any moment, but all except the one thing occupy a secondary place, or are not present to our consciousness at all. They exist on the margin, or else are clear off the edge of consciousness, while the one thing occupies the center. We may be reading a fascinating book late at night in a cold room. The charm of the writer, the beauty of the heroine, or the bravery of the hero so occupies the mind that the weary eyes and chattering teeth are unnoticed. Consciousness has piled up in a high wave on the points of interest in the book, and the

bodily sensations are for the moment on a much lower level. But let the book grow dull for a moment, and the make-up of the stream changes in a flash. Hero,

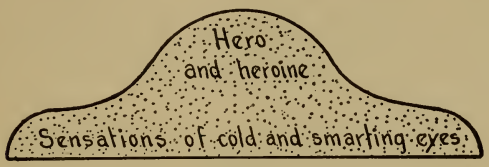

Fig. 2.

heroine, or literary style no longer occupies the wave. They forfeit their place, the wave is taken by the bodily sensations, and we are conscious of the smarting eyes and shivering body, while these in turn give

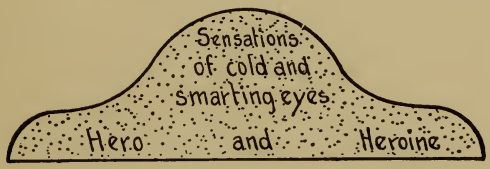

Fig. 3.

way to the next object which occupies the wave. Figs. 1–3 illustrate these changes.

Consciousness likened to a field.

The consciousness of any moment has been less happily likened to a field, in the center of which there is an elevation higher than the surrounding level. This center is where consciousness is piled up on the object which is for the moment foremost in our thought. The other objects of our consciousness are on the margin of the field for the time being, but any of them may the next moment claim the center and drive the former object to the margin, or it may drop entirely out of consciousness. This moment a noble resolve

may occupy the center of the field, while a troublesome tooth begets sensations of discomfort which linger dimly on the outskirts of our consciousness; but a shooting pain from the tooth or a random thought crossing the mind, and lo! the tooth holds sway, and the resolve dimly fades away to the margin of our consciousness and is gone.

The "piling up" of consciousness is attention.

This figure is not so true as the one which likens our mind to a stream with its ever onward current answering to the flow of our thought; but whichever figure we employ, the truth remains the same. Consciousness is always piled up higher at some one point than at others. Either because our interest leads us, or because the will dictates, the mind is withdrawn from the thousand and one things which we might think about, and directed to this one thing, which for the time occupies chief place. In other words, we *attend*, for this piling up of consciousness is nothing, after all, but attention.

The contents of our mental stream.

We have seen that our mental life may be likened to a stream flowing now faster, now slower, ever shifting, never ceasing. We have yet to inquire what constitutes the mass of the stream, or, in popular phrase, what is the "stuff" which makes up the current of our thought, what are the contents of our minds. This cannot be answered completely at this point, but can best be understood by each referring to his own experience to verify the description of the text. If we are sitting at our study table puzzling over a difficult problem in geometry, *reasoning* forms the wave in the stream of consciousness—the center of the field. It is the chief thing in our thinking. The fringe of our consciousness is made up of various sensations of the light from the lamp, the contact of our clothing, the

sounds going on in the next room, some bit of memory seeking recognition, a " tramp " thought which comes along, and a dozen other experiences not strong enough to occupy the center of the field.

But instead of the study table and the problem, give us a bright fireside, an easy-chair, and nothing to do. If we are aged, *memories*—images from out the past, will probably come thronging in and occupy the field to such extent that the fire burns low and the room grows cold; but still the forms from the past hold sway. If we are young, visions of the future may crowd everything else to the margin of the field, while the " castles in Spain " occupy the center.

Our memories may also be accompanied by emotions—sorrow, love, anger, hate, envy, joy. And, indeed, these emotions may so completely occupy the field that the images themselves are for the time driven to the margin, and the mind is occupied with its sorrow, its love, or its joy.

Once more, instead of the problem or the memories or the " castles in Spain," give us the necessity of making some decision, great or small, where contending motives are pulling us now in this direction, now in that, so that the question finally has to be settled by a supreme effort summed up in the words, *I will.* This is the struggle of the will which each one knows for himself, for who has not had a raging battle of motives occupy the center of the field while all else, even the sense of time, place, and existence, gave way in the face of this conflict! This struggle continues until the decision is made, when suddenly all the stress and strain drop out and other objects may again have their place in consciousness.

Thus we see that if we could cut the stream of con-

A three-fold process —knowing, feeling, and willing.

sciousness across as we might cut a stream of water from bank to bank with a huge knife, and then look at the cut-off section, we should find very different constituents in the stream at different times. We should at one time find the mind manifesting itself in *perceiving, remembering, imagining, discriminating, comparing, judging, reasoning,* or the acts by which we gain our knowledge; at another in *fearing, loving, hating, sorrowing, enjoying,* or the acts of feeling; at still another in *choosing,* or the act of the will. These processes would make up the stream, or, in other words, these are the acts which the mind performs in doing its work. We should never find a time when the stream consists of but one of the processes, or when all these modes of mental activity are not represented. They will be found in varying proportions, now more of knowing, now of feeling, and now of willing, but some of each is always present in our consciousness. The nature of these different elements in our mental stream, their relation to each other, and the manner in which they all work together in amazing perplexity yet in perfect harmony to produce the wonderful *mind,* will constitute the subject-matter we shall consider together in the pages which follow.

EXERCISES

Think of your home as you last left it. Can you see vividly just how it looked, the color of the paint on the outside, with the familiar form of the roof and all; can you recall the perfume in some old drawer, the taste of a favorite dish, the sound of a familiar voice in farewell?

When you say that you remember a circumstance which occurred yesterday, how do you remember it? That is, do

you see in your mind things just as they were, and hear again sounds which occurred, or feel again movements which you performed? Do you experience once more the emotion you then felt?

Try occasionally during the next twenty-four hours to turn quickly about mentally and see whether you can observe your thinking, feeling, or willing in the very act of taking place.

What becomes of our mind or consciousness while we are asleep?

How are we able to wake up at a certain hour previously determined?

Can a person have absolutely *nothing* in his mind?

SUGGESTED READINGS

James, "Psychology," Briefer Course, Chapter XI.

James, "Principles of Psychology," Chapter IX.

Baldwin, "The Story of the Mind," Chapters II–IV.

Morgan, "Introduction to Comparative Psychology," Chapter I.

Dewey, "Psychology," Chapter II.

Royce, "Outlines of Psychology," Chapter IV, secs. 34–36.

CHAPTER II

ATTENTION

The nature of attention.

In the last chapter the concentration of consciousness on one object was described as constituting a state of attention. Everyone knows what it is to attend. The story so fascinating that we cannot leave it, the critical points in a game, the interesting sermon or lecture, the sparkling conversation, the absorbing lesson or recitation—these all compel our attention. We live in them, and are almost unaware of what is going on about us. It is easier to attend to them than not. But what about the dull story, the slow game, the lecture or sermon which drags, the conversation which is a bore, the lesson without life or interest? These may likewise all receive attention, but in this case we attend with effort. A thousand things from outside entice us away from them. It requires the frequent "mental jerk" with which each is familiar to bring ourselves back to them; and when brought back, we feel the constant "tug" of the mind to be free again.

Some degree of attention always present.

But this very effort of the mind to free itself from one object of thought that it may busy itself with another, is because the attention is solicited by this other. That is, attention of *some* sort is present at all times when we are thinking, which is only equivalent to saying that some one object of thought is always more prominent than the remainder of the

objects in consciousness at that moment. Indeed, without this condition it is doubtful whether we can think at all; and, roughly speaking, the efficiency of our thinking is directly proportional to our ability to attend to one object of thought to the exclusion of all others. I say " to the exclusion of all others " because, when we are attending to a certain object, the mind must be withdrawn from a multitude of other objects upon which it might rest, and be focused on this one thing. Attention is, after all, as much attending *away from* unnecessary or irrelevant thoughts as it is attending *to* necessary and relevant ones.

The effects of attention.

A state of attention gives us the " wave " in the stream of consciousness piled up high above the common level of the surface. It gives us the " center " of the field rising vivid and clear above the remainder of consciousness. And whatever the wave or center may be, whether it be a bit of a memory, an air castle, a sensation from an aching tooth, the reasoning on an algebraic formula, a choice which we are making, the setting of an emotion—whatever be the object to which we are attending, that object is illumined and made to stand out from its fellows as the one prominent thing in the mind's eye while the attention rests on it. It is like the one building which the search light picks out among a city full of buildings and lights up, while the remainder are left in the semilight or in darkness.

Only concentration will bring results.

In a state of attention the mind may be likened to the rays of the sun which have been passed through a burning glass. You may let all the rays which can pass through your window pane fall hour after hour upon the paper lying on your desk, and no marked

effects follow. But let the same amount of sunlight be passed through a lens and converged to a point the size of your pencil point, and the paper will at once burst into flame. What the diffused rays could not do in hours or in ages is now accomplished in seconds. Likewise the mind, allowed to scatter over many objects, can accomplish but little. We may sit and dream away an hour or a day over a page or a problem without securing results. But let us call in our wits from their woolgathering and "buckle down to it" with all our might, withdrawing our thoughts from everything else but this *one thing*, and concentrating our mind on it. More can now be accomplished in minutes than before in hours. Nay, *things which could not be accomplished at all before* now become possible.

Geometrical increase of efficiency.

Again, the mind may be compared to a steam engine which is constructed to run at a certain pressure of steam, say one hundred and fifty pounds to the square inch of boiler surface. Once I ran such an engine; and well I remember a morning during my early apprenticeship when the foreman called for power to run some of the lighter machinery, while my steam gauge registered but seventy-five pounds. "Surely," I thought, "if one hundred and fifty pounds will run all this machinery, seventy-five pounds should run half of it," so I opened the valve. But the powerful engine could do but little more than turn its own wheels, and refused to do the required work. Not until the pressure had risen above one hundred pounds could the engine perform half the work which it could at one hundred and fifty pounds. And so with our mind. If it is meant to do its best work under a certain degree of concentration, it cannot

in a given time do half the work with half the attention. Further, there will be much *which it cannot do at all* unless working under full pressure. We shall not be overstating the case if we say that as attention increases in arithmetical ratio, mental efficiency increases in geometrical ratio. It is in large measure a difference in the power of attention which makes one man a master in thought and achievement and another his humble follower. One often hears it said that "genius is but the power of sustained attention," and this statement possesses a large element of truth.

How we attend.

Some one has said that if our attention is properly trained we should be able "to look at the point of a cambric needle for half an hour without winking." But this is a false idea of attention. The ability to look at the point of a cambric needle for half an hour might indicate a very laudable power of concentration; but the process, instead of enlightening us concerning the point of the needle, would result in our passing into an hypnotic state. The monks of Mount Athos had discovered the effect of long concentration on a single point, but misunderstood its import. They are said to have had an exercise in which each retired to his cell alone, drooped his head until the chin rested upon his breast, and solemnly "contemplated the center of his abdomen." After a time the holy man saw "a majestic and ethereal light." It is safe to say, however, that no additional light was thrown on the object of his contemplation.

When we are attending strongly to one object of thought it does not mean that consciousness sits staring vacantly at this one object, but rather that it uses it as a central core of thought, and thinks into relation with this object the things which belong with

it. In working out some mathematical solution the central core is the principle upon which the solution is based, and concentration in this case consists in thinking the various conditions of the problem in relation to this underlying principle. In the accompanying diagram (Fig. 4) let *A* be the central core of some object of thought, say a patch of cloud in a

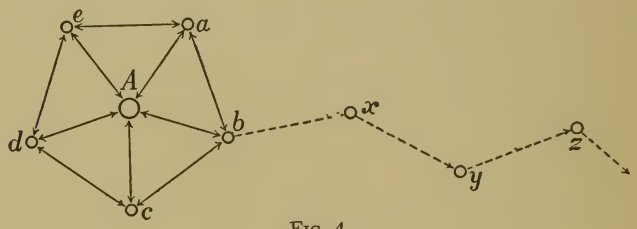

FIG. 4.

picture, and let *a*, *b*, *c*, *d*, etc., be the related facts, or the shape, size, color, etc., of the cloud. The arrows indicate the passing of our thought from cloud to related fact, or from related fact to cloud, and from related fact to related fact. As long as these related facts lead back to the cloud each time, that long we are attending to the cloud and thinking about it. It is when our thought fails to go back that we "wander" in our attention. Then we leave *a*, *b*, *c*, *d*, etc., which are related to the cloud, and, flying off to *x*, *y*, and *z*, finally bring up heaven knows where.

Lack of concentration.

The two chief types of inattention have already been mentioned. *First*, we may be thinking about the right things, but not thinking *hard* enough. We lack mental pressure. Outside thoughts which have no relation to the subject in hand may not trouble us much, but we do not attack our problem with vim. The current in our stream of consciousness is moving

too slowly. We do not gather up all our mental forces and mass them on the subject before us in a way that means victory. Our thoughts may be sufficiently focused, but they fail to "set fire." It is like focusing the sun's rays while an eclipse is on. They lack energy. They will not kindle the paper after they have passed through the lens. This kind of attention means mental dawdling. It means inefficiency. For the individual it means defeat in life's battles; for the nation it means mediocrity and stagnation.

A college professor said to his faithful but poorly prepared class, "Judging from your worn and tired appearance, young people, you are putting in twice too many hours on study." At this commendation the class brightened up visibly. "But," he continued, "judging from your preparation, you do not study quite half hard enough."

Happy is the student who, starting in on his lesson rested and fresh, can study with such concentration that an hour of steady application will leave him mentally exhausted and limp. That is one hour of triumph for him, no matter what else he may have accomplished or failed to accomplish during the time. He can afford an occasional pause for rest, for difficulties will melt rapidly away before him. He possesses one key to successful achievement.

Mental wandering.

Second, we may have good mental power and be able to think hard and efficiently on any one point, but lack the power to think in a straight line. Every stray thought that comes along is a "will-o'-the-wisp" to lead us away from the subject in hand and into lines of thought not related to it. Who has not started in to think on some problem, and, after a

few moments, been surprised to find himself miles away from the topic upon which he started! Or who has not read down a page and, turning to the next, found that he did not know a word on the preceding page, his thoughts having wandered away, his eyes only going through the process of reading! Instead of sticking to the *a, b, c, d,* etc., of our topic and relating them all up to *A,* thereby reaching a solution of the problem, we often jump at once to *x, y, z,* and find ourselves far afield with all possibility of a solution gone. We may have brilliant thoughts about *x, y, z*; but they are not related to anything in particular, and so they pass from us and are gone—lost in oblivion because they are not attached to something permanent.

Such a thinker is at the mercy of circumstances, following blindly the leadings of trains of thought which are his master instead of his servant, and which lead him anywhere or nowhere without let or hindrance from him. His consciousness moves rapidly enough and with enough force, but it is like a ship without a helm. Starting for the intellectual port *A* by way of *a, b, c, d,* he is mentally shipwrecked at last on the rocks *x, y, z,* and never reaches harbor. Fortunate is he who can shut out intruding thoughts and think in a straight line. Even with mediocre ability he may accomplish more by his thinking than the brilliant thinker who is constantly having his mental train wrecked by stray thoughts which slip in on his right of way.

Cultivation of attention.

While attention is no doubt partly a natural gift, yet there is probably no power of the mind more susceptible to training than is attention. And with attention, as with every other power of body and mind,

the secret of its development lies in its use. Stated briefly, the only way to train attention is by attending. No amount of theorizing or resolving can take the place of practice in the actual process of attending.

How attention is secured.

Attention may be secured in three ways: Either (1) it is demanded by some sudden or intense sensory stimulus or insistent idea, or (2) it follows interest, or (3) it is compelled by the will. If it comes in the first way, as from a thunderclap or a flash of light, or from the persistent attempt of some unsought idea to secure entrance into the mind, it is called *involuntary* attention. This form of attention is of so little importance, comparatively, in our mental life that we shall not discuss it further.

If attention comes in the second way, following interest, it is called *nonvoluntary* or spontaneous attention; if in the third, compelled by the will, *voluntary* or active attention. Nonvoluntary attention has its motive in some object external to consciousness, or else follows a more or less uncontrolled current of thought which interests us; voluntary attention is controlled from within—*we* decide what we shall attend to instead of letting interesting objects of thought determine it for us.

Interest and nonvoluntary attention.

In nonvoluntary attention the environment largely determines what we shall attend to. All that we have to do with directing this kind of attention is in developing certain lines of interest, and then the interesting things attract attention. The things we see and hear and touch and taste and smell, the things we like, the things we do and hope to do—these are the determining factors in our mental life so long as we are giving nonvoluntary attention. Our attention follows the beckoning of these things as the

needle the magnet. It is no effort to attend to them, but rather the effort would be to keep from attending to them. Who does not remember reading a story, perhaps a forbidden one, so interesting that when mother called up the stairs for us to come down to attend to some duty, we replied, "Yes, in a minute," and then went on reading! We simply could not stop at that place. The minute lengthens into ten, and another call startles us. "Yes, I'm coming"; we turn just one more leaf, and are lost again. At last comes a third call in tones so imperative that it cannot be longer ignored, and we lay the book down, but open to the place where we left off, and where we hope soon to begin further to unravel the delightful mystery. Was it an effort to attend to the reading? Ah, no! it took the combined force of our will and of mother's authority to drag the attention away. This is nonvoluntary attention.

Nonvoluntary attention takes the line of least resistance.

Left to itself, then, attention simply obeys natural laws and follows the line of least resistance. By far the larger portion of our attention is of this type. Thought often runs on hour after hour when we are not conscious of effort or struggle to compel us to cease thinking about this thing and begin thinking about that. Indeed, it may be doubted whether this is not the case with some persons for days at a time, instead of hours. The things that present themselves to the mind are the things which occupy it; the character of the thought is determined by the character of our interests. It is this fact which makes it so vitally necessary that our interests shall be broad and pure if our thoughts are to be of this type. It is not enough that we have the strength to drive from our minds a wrong or impure thought which seeks en-

trance. To stand guard as a policeman over our thoughts to see that no unworthy one enters, requires too much time and energy. Our interests must be of such a nature as to lead us away from the field of unworthy thoughts if we are to be free from their tyranny.

The will and voluntary attention.

In voluntary attention there is a conflict either between the will and interest or between the will and the mental inertia or laziness which has to be overcome before we can think with any degree of concentration. Interest says, "Follow this line, which is easy and attractive, or which requires but little effort—follow the line of least resistance." Will says, "Quit that line of dalliance and ease, and take this harder way which I direct—cease the line of least resistance and take the one of greatest resistance." When day dreams and "castles in Spain" attempt to lure you from your lessons, refuse to follow; shut out these vagabond thoughts and stick to your task. When intellectual inertia deadens your thought and clogs your mental stream, throw it off and court forceful effort. If wrong or impure thoughts seek entrance to your mind, close and lock your mental doors to them. If thoughts of desire try to drive out thoughts of duty, be heroic and insist that thoughts of duty shall have right of way. In short, be *you* the master of your thinking, and do not let it always be directed without your consent by influences outside of yourself.

Value of the power to control attention.

It is just at this point that the strong will wins victory and the weak will breaks down. Between the ability to control one's thoughts and the inability to control them lies all the difference between right actions and wrong actions; between withstanding temp-

tation and yielding to it; between an inefficient, purposeless life and a life of purpose and endeavor; between success and failure. For we act in accordance with those things which our thought rests upon. Suppose two lines of thought represented by *A* and *B*, respectively, lie before you; that *A* leads to a course of action difficult or unpleasant, but necessary to success or duty, and that *B* leads to a course of action easy or pleasant, but fatal to success or duty. Which course will you follow—the rugged path of duty or the easier one of pleasure? The answer depends almost wholly, if not entirely, on your power of attention. If your will is strong enough to pull your thoughts away from the fatal but attractive *B* and hold them resolutely on the less attractive *A*, then *A* will dictate your course of action, and you will respond to the call for endeavor, self-denial, and duty; but if your thoughts break away from the domination of your will and follow the beckoning of your interests alone, then *B* will dictate your course of action, and you will follow the leading of ease and pleasure. *For our actions are finally and irrevocably dictated by the things we think about.*

Not really different kinds of attention.

It is not to be understood, however, from what has been said, that there are really different *kinds* of attention. All attention denotes an active or dynamic phase of consciousness. The difference is rather *in the way we secure attention;* whether it is demanded by sudden stimulus, coaxed from us by interesting objects of thought without effort on our part, or compelled by force of will to desert the more interesting and take the direction which we dictate.

A very close relationship and interdependence exists between nonvoluntary and voluntary attention. It

would be impossible to hold our attention by sheer force of will on objects which were forever devoid of interest; likewise the blind following of our interests and desires would finally lead to shipwreck in all our lives. Each kind of attention must support and reënforce the other. The lessons, the sermons, the lectures, and the books in which we are most interested, and hence to which we attend nonvoluntarily and with the least effort and fatigue, are the ones out of which, other things being equal, we get the most and remember the best and longest. On the other hand, there are sometimes lessons and lectures and books, and many things besides, which are not intensely interesting, but which should be attended to nevertheless. It is at this point that the will must step in and take command. If it has not the strength to do this, it is in so far a weak will, and steps should be taken to develop it. We are to "*keep the faculty of effort alive in us by a little gratuitous exercise every day.*" We are to be systematically heroic in the little points of everyday life and experience. We are not to shrink from tasks because they are difficult or unpleasant. Then, when the test comes, we shall not find ourselves unnerved and untrained, but shall be able to stand in the evil day.

Interrelation of forms of attention.

Finally, one of the chief things in training the attention is *to form the habit of attending.* This habit is to be formed only by *attending* whenever and wherever the proper thing to do is to attend, whether "in work, in play, in making fishing flies, in preparing for an examination, in courting a sweetheart, in reading a book." The lesson, or the sermon, or the lecture, may not be very interesting; but if they are to be attended to at all, our rule should be

The habit of attention.

to attend to them completely and absolutely. Not by fits and starts, now drifting away and now jerking ourselves back, but *all the time.* And, furthermore, the one who will deliberately do this will often find the dull and uninteresting task become more interesting; but if it never becomes interesting, he is at least forming a habit which will be invaluable to him through life. On the other hand, the one who fails to attend except when his interest is captured, who never exerts effort to compel attention, is forming a habit which will be the bane of his thinking until his stream of thought shall end.

EXERCISES

Look in upon your thought occasionally and discover what constitutes the "wave."

Did your attention follow your interest, or was it compelled by your will? Which type of attention can you sustain the longer?

Which gives you the better immediate results?

If you find it impossible to hold your mind down to study, where does the difficulty lie?

Is it possible that some things may be uninteresting to us only because we do not know enough about them?

Are you improving in your power of attention?

SUGGESTED READINGS

Angell, "Psychology," Chapter IV.
James, "Psychology," Briefer Course, Chapter XIII.
James, "Principles of Psychology," Chapter XI.
Sully, "The Human Mind," vol. i., pp. 74–79.
Dewey, "Psychology," Chapter IV, sec. 5.
Stout, "The Groundwork of Psychology," Chapter VI.
Royce, "Outlines of Psychology," pp. 257–268.
Oppenheim, "Mental Growth and Control," Chapter III.

CHAPTER III

THE BRAIN AND NERVOUS SYSTEM

Mind and brain.

A FINE brain, or a good mind. These terms are often used interchangeably, as if they were synonomous. Yet the one stands for a material thing—so many cells and fibers combined in a soft, pulpy mass of gray and white, weighing some three pounds, and shut away from the outside world in a closed casket of bone; the other stands for a spiritual thing—for the sum of the processes by which we think and feel and will, and which have made man the master of his environment and given him the magnificent sum total of human culture and attainment. How, then, came these so widely different facts, the mind and the brain, ever to be confused in our speech? How came we to use the terms interchangeably? It is because the mind and the brain are so vitally related and so inseparably connected in their work. We have never known a mind except in connection with some brain, and a brain without a mind becomes but a mass of dead matter, of no more value than so much clay. Each has grown up and developed into its present state of efficiency by working in conjunction with the other, not only in each individual from birth to maturity, but also in the race, through the countless ages of its history. The brain of the babe is as much inferior to that of the adult as its mind is below the adult mind; likewise the same law holds if we compare primitive men with civilized.

The brain as the mind's machine.

In the first chapter we saw that the brain does not create the mind, but that the mind works through the brain. No one can believe that the brain secretes mind as the liver secretes bile, or that it grinds it out as a mill does flour. Indeed, just what their exact relation is has not yet been settled. Yet it is easy to see that if the mind must use the brain as a machine and work through it, then the mind must be subject to the limitations of its machine, or, in other words, the mind cannot be better than the brain through which it operates. A brain and nervous system that are poorly developed or insufficiently nourished mean a low grade of efficiency in our mental processes, just as a poorly constructed or wrongly adjusted motor means loss of power in applying the electric current to its work. We will, then, look upon the mind and the brain as counterparts of each other, each performing activities which correspond to activities in the other, both inextricably bound together at least so far as this life is concerned, and each getting its significance by its union with the other. This view will lend interest to a brief study of the brain and nervous system.

Relation of nervous system to mind.

But can we first see how in a general way the brain and nervous system are primarily related to our thinking? Let us go back to the beginning and consider the babe when it first opens its eyes on the scenes of its new existence. What is in its mind? What does it think about? Nothing. Imagine, if you can, a person born blind and deaf, and without the sense of touch, taste, or smell. Let such a person live on for a year, for five years, for a lifetime. What would he know? What ray of intelligence would enter his mind? What would he think about? All would be

dark to his eyes, all silent to his ears, all tasteless to his mouth, all odorless to his nostrils, all touchless to his skin! His mind would be a blank. He would have no mind. He could not get started to think. He could not get started to act. He would belong to a lower scale of life than the tiny animal that floats with the waves and the tide in the ocean without power to direct its own course. He would be but an inert mass of flesh without sense or soul.

The mind at birth.

Yet this is the condition of the babe at birth. It is born blind and deaf, without the sense of temperature, taste, or smell. Born without anything to think about, and no way to get anything to think about until the senses wake up and furnish some material from the outside world. Born with all the mechanism of muscle and nerve ready to perform the countless complex movements of arms and legs and body which characterize every child, he could not even start on these activities without a message from the senses to set them going. At birth the child probably has only the senses of contact and temperature present; taste soon follows; sight in a few days; hearing about the same time, and smell a little later. The senses are waking up and beginning their acquaintance with the outside world.

The work of the senses.

And what a problem the senses have to solve! On the one hand the great universe of sights and sounds, of tastes and smells, of contacts and temperatures, and whatever else may belong to the material world in which we live; and on the other hand the little shapeless mass of gray and white pulpy matter incapable of sustaining its own shape, and shut away in the darkness of a bony case with no possibility of contact with the outside world, and no means of com-

municating with it except through the senses. And yet this universe of external things must be brought into communication with the seemingly insignificant but really wonderful thing we call the brain, else the mind could never be. Here we discover, then, the two

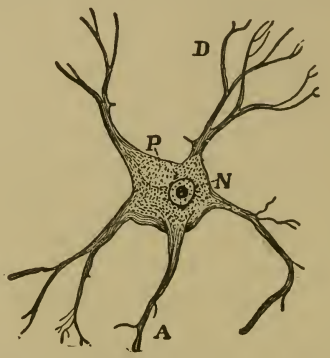

FIG. 5.—A neuron from a human spinal cord. The central portion represents the cell body; *N*, the nucleus; *P*, a pigmented or colored spot; *D*, a dendrite, or relatively short fiber, which branches freely; *A*, an axon, or long fiber, which branches but little.

great factors which first require our study if we would understand the growth of the mind—*the material world without and the brain within.* For it is the action and interaction of these which lie at the bottom of the mind's development. Let us first look a little more closely at the brain and the accompanying nervous system.

The structure of the nervous system.

The nervous system, including the brain, is made up of nerve cells and their outgrowing fibers. Each separate cell body, with its filamentous elongations, is called a *neuron.* The cell may be thought of as the original or fundamental part of the neuron, for the fibers are in all cases formed by an outgrowth from

cells. The cells are of various shapes, gray in color, and are found for the most part in the brain and spinal cord, and little masses of them called *ganglia* are found distributed at intervals along the nerves which lead to the periphery of the body. The cells form that part of the brain and cord usually called the "gray matter." They vary from $\frac{1}{250}$ to $\frac{1}{3600}$ of an inch in diameter. In man's brain and spinal cord alone there are some three thousand millions of neurons.

Like the battery cells in an electrical apparatus, the nerve cells are generators of energy, supplying the force which governs our movements, interprets our

Nerve cells and fibers.

FIG. 6.—Neurons in different stages of development, from *a* to *e*. In *a*, the elementary cell body alone is present; in *c*, a dendrite is shown projecting upward, and an axone downward.—After DONALDSON.

sensations, and does our thinking; for these things require the expenditure of energy quite as much as does the running of wheels and pulleys or the lifting of weights. The fibers, which, as said above, are but elongations of the cells, are, like the wires in an electrical

apparatus, the conductors of energy. They carry the force supplied by the cells, serving to connect the different parts of the nervous system with each other functionally so that they may work in harmony. They bear the messages from the outside world to the brain and spinal cord, and finally connect all with the muscles, thus making possible the harmonious move-

FIG. 7.—Longitudinal (*A*) and transverse (*B*) sections of nerve fibers. The heavy border represents the medullary, or enveloping, sheath, which becomes thicker in the larger fibers. Sciatic nerve. Human × 400 diameters.—After DONALDSON.

ments of the body. Something may be guessed of the number and size of the fibers from the fact that more than two and a half millions of sensory fibers alone terminate in the brain.

Central and peripheral systems.

The nervous system may, for the purpose of description, conveniently be divided into two parts: (1) The central nervous system, consisting of the brain and spinal cord, and (2) the peripheral system, consisting of the afferent or in-bearing and efferent or out-bearing branches which connect the central system with the periphery of the body. A brief description of each of these parts will help us to understand better how they all work together in so wonderful a way to accomplish their great result.

The spinal cord.

The spinal cord proceeds from the base of the brain downward about eighteen inches through a canal provided for it in the vertebræ of the spinal column. It is composed of white matter, or fibers, on the outside, and gray matter, or cells, within. A deep fissure on

the anterior side and another on the posterior cleave the cord nearly in twain, resembling the brain in this particular. The gray matter on the interior is in the form of two crescents connected by a narrow bar.

The brain.

In the brain we easily distinguish three major divisions—the *medulla oblongata*, the *cerebellum*, and the *cerebrum*. The medulla is but an enlargement of the upper part of the cord where it connects with the brain. It is about an inch and a quarter long, and is composed of both white and gray matter, but not regularly arranged as in the cord. For here the gray, which is on the inside in the cord, is passing to the outside, which is its location in the cerebrum; and the

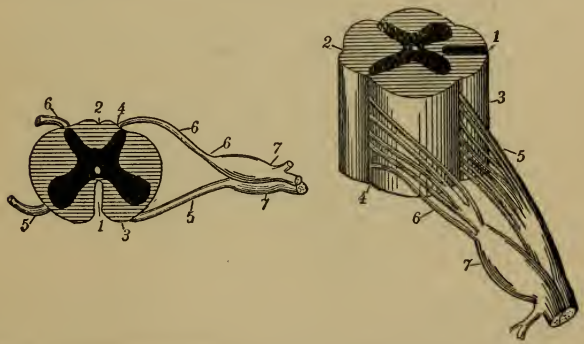

Fig. 8.—Different aspects of sections of the spinal cord and of the roots of the spinal nerves from the cervical region: *1*, different views of anterior median fissure; *2*, posterior fissure; *3*, anterior lateral depression for anterior roots; *4*, posterior lateral depression for posterior roots; *5* and *6*, anterior and posterior roots, respectively; *7*, complete spinal nerve, formed by the union of the anterior and posterior roots.

white is passing inward, where it is found in the cerebrum. Here also the fibers are crossing or changing sides, so that those which pass up the right side of the cord finally connect with the left side of the brain.

The cerebellum.

Lying just back of the medulla and at the rear part of the base of the cerebrum is the cerebellum, or "little brain," approximately as large as the fist, and composed of a complex arrangement of white and gray matter. Fibers from the spinal cord enter this

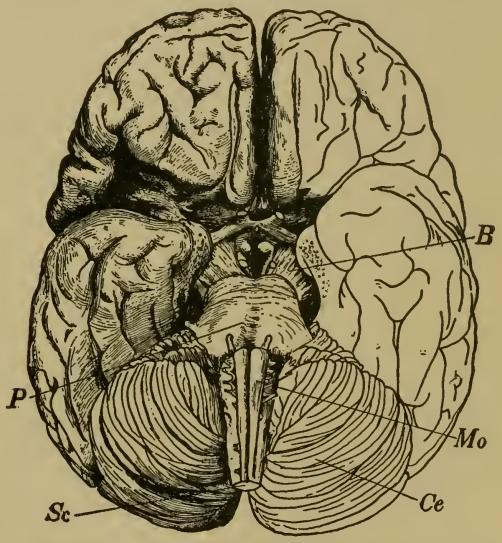

FIG. 9.—View of the under side of the brain. *B*, basis of the crura; *P*, pons; *Mo*, medulla oblongata; *Ce*, cerebellum; *Sc*, spinal cord.

mass, and others emerge and pass on into the cerebrum, while its two halves also are connected with each other by means of cross fibers.

The cerebrum.

The cerebrum occupies all the upper part of the skull from the front to the rear. It is divided symmetrically into two hemispheres, the right and the left. These hemispheres are connected with each other by a small bridge of fibers called the *corpus callosum*. Each hemisphere is furrowed and ridged with convolutions,

an arrangement which allows greater surface for the distribution of the gray cellular matter over it. Besides these irregularities of surface, each hemisphere is marked also by two deep clefts or *fissures*—the fissure of Rolando, extending from the middle upper part of the hemisphere downward and forward, passing a little in front of the ear and stopping on a level with the upper part of it; and the fissure of Sylvius, beginning at the base of the brain somewhat in

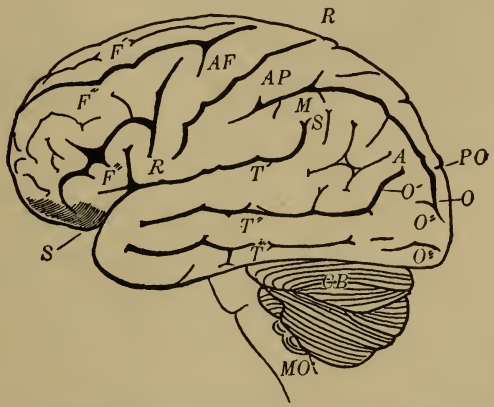

FIG. 10.—Diagrammatic side view of brain, showing cerebellum (*CB*) and medulla oblongata (*MO*). F′ F″ F‴ are placed on the first, second, and third frontal convolutions; *AF*, on the ascending frontal; *AP*, on the ascending parietal; *M*, on the marginal; *A*, on the angular. *T′ T″ T‴* are placed on the first, second, and third temporal convolutions. *R-R* marks the fissure of Rolando; *S-S*, the fissure of Sylvius; *PO*, the parieto-occipital fissure.—After ANGELL.

front of the ear and extending upward and backward at an acute angle with the base of the hemisphere.

The surface of each hemisphere may be thought of as mapped out into four lobes: The frontal lobe, which

The lobes of the hemispheres.

includes the front part of the hemisphere and extends back to the fissure of Rolando and down to the fissure of Sylvius; the parietal lobe, which lies back of the fissure of Rolando and above that of Sylvius and ex-

Fig. 11.—The projection fibers of the brain. I–IX, the first nine pairs of cranial nerves.

tends back to the occipital lobe; the occipital lobe, which includes the extreme rear portion of the hemisphere; and the temporal lobe, which lies below the fissure of Sylvius and extends back to the occipital lobe.

The cortex.

The gray or cellular matter in the hemispheres, unlike that in the cord, lies on the surface. This rind of gray matter is called the *cortex*, and it varies from one-twelfth to one-eighth of an inch in thickness. (See Figs. 11 and 12.) The greater part of the mass of the hemispheres is formed by the white matter or fibers.

The fibers.

These fibers are of three kinds: (1) *Projection* fibers, which are the fibers from the spinal cord and which spread out fanlike to all parts of the hemispheres, bringing sensory impulses in and carrying motor impulses back to the muscles; (2) *association* fibers, which connect the different convolutions of the same hemisphere with each other, and thus make it possible for the different senses to work together, as when some object we see calls up in the mind a sound, or taste, or smell, or touch which was at a former time associated with it; and (3) *commissural* fibers, which connect the corresponding parts of the two hemispheres with each other, and thus make it possible for the two sides of the body to work in harmony.

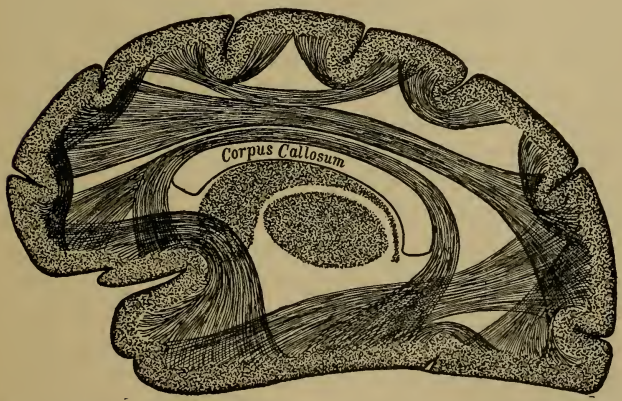

FIG. 12.—Schematic diagram showing association fibers connecting cortical centers with each other.—After JAMES and STARR.

The peripheral system.

The peripheral nervous system consists of thirty-one pairs of nerves branching off from the spinal cord, a sensory nerve root from the posterior and a motor from the anterior part of the cord at the same

level. (See Fig. 8.) Soon after their emergence from the cord, these nerves are wrapped together in the same sheath and proceed in this way to the periphery of the body, where the sensory nerve usually ends in a specialized end organ fitted to respond to some certain stimulus from the outside world. The motor nerve ends in minute filaments in the muscular organ which it governs. Both sensory and motor nerves connect with fibers of like kind in the cord and these in turn with the cortex, thus giving every part of the periphery direct connection with the cortex. Twelve pairs of nerves arise from the brain itself, and extend either to the periphery of the body or else to certain of the visceral organs.

The end organs.

The end organs of the sensory nerves are all alike in one particular: namely, that each is fitted for its own particular work, and can do no other. Thus the eye is the end organ of sight, and is a wonderfully complex arrangement of nerve structure combined with refracting media, and arranged to respond to the rapid ether waves of light. The ear has for its essential part the specialized endings of the auditory nerve, and is fitted to respond to the waves carried to it in the air, giving the sensation of sound. The end organs of touch, found in greatest perfection in the finger tips, are of several kinds, all very complicated in structure. And so on with each of the senses. Each has some form of end organ specially adapted to respond to the kind of stimulus upon which its sensation depends, and each is insensible to the stimuli of the others, much as the receiver of a telephone will respond to the tones of our voice, but not to the touch of our fingers as will the telegraph instrument, and *vice versa*. Thus the eye is not affected by sounds, nor

touch by light; yet by the means of all the senses we are able to come in contact with the material world in a variety of ways.

Division of labor in the nervous system.

Division of labor is the law in the organic world as in the industrial. Animals of the lowest type, such as the amœba, do not have separate organs for respiration, digestion, assimilation, elimination, etc., the one tissue performing all of these functions. But in the higher forms each organ not only has its own specific work, but even within the same organ each part has its own particular work assigned. Thus we have seen that the two parts of the neuron perform different functions, the cells generating energy and the fibers transmitting it. It will not seem strange, then, that there is also a division of labor in the cellular matter itself in the nervous system. For example, the little masses of ganglia which are distributed at intervals along the nerves are probably for the purpose of reënforcing the nerve current, much as the battery cells in the local telegraph office reënforce the current from the central office; the cellular matter in the spinal cord and lower parts of the brain has a very important work to perform in receiving messages from the senses and responding to them in directing the simpler reflex acts and movements which we learn to execute without our consciousness being called upon, thus leaving the mind free from these petty things to busy itself in higher ways; the cellular matter of the cortex performs the highest functions of all, for through its activity we have consciousness—thought, feeling, and will. The gray matter of the cerebellum, the medulla, and the cord may receive impressions from the senses and respond to them with movements, but their response is in all cases wholly automatic and uncon-

scious. A person whose hemispheres had been injured in such a way as to interfere with the activity of the cortex might still continue to perform most if not all of the habitual movements of his life, but they would be mechanical and not intelligent. He would lack all higher consciousness. It is through the activ-

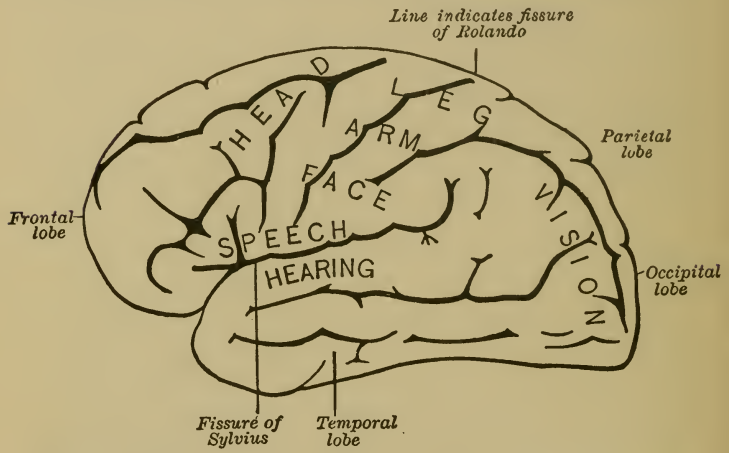

FIG. 13.—Side view of left hemisphere of human brain, showing the principal localized areas.

ity of this thin covering of cellular matter of the cerebrum that our minds operate; here are received stimuli from the different senses, and here sensations are experienced. Here all our movements which are consciously directed have their origin. And here all our thinking, feeling, and willing are done.

Division of labor in the cortex.

Nor does the division of labor in the nervous system end with this assignment of work. The cortex itself probably works essentially as a unit, yet it is through a shifting of tensions from one area to another that it acts, now giving us a sensation, now di-

recting a movement, and now thinking a thought or feeling an emotion. Localization of function is the rule here also. Certain areas of the cortex are devoted chiefly to sensations, others to motor impulses, and others to higher thought activities, yet in such a way that all work together in perfect harmony, each reënforcing the other and making its work significant. Thus the front portion of the cortex seems to be devoted to the higher thought activities; the region on both sides of the fissure of Rolando, to motor activities; and the rear and lower parts to sensory activities; and all are bound together and made to work together by the association fibers of the brain.

In the case of the higher thought activities, it is not probable that one section of the frontal lobes of the cortex is set apart for thinking, one for feeling, and one for willing, etc., but rather that the whole frontal part of the cortex is concerned in each. In the motor and sensory areas, however, the case is different; for here a still further division of labor occurs. For example, in the motor region one small area seems connected with movements of the head, one with the arm, one with the leg, one with the face, and another with the organs of speech; likewise in the sensory region, one area is devoted to vision, one to hearing, one to taste and smell, and one to touch, etc. We must bear in mind, however, that these regions are not mapped out as accurately as are the boundaries of our States—that no part of the brain is restricted wholly to either sensory or motor nerves, and that no part works by itself independently of the rest of the brain. We name a tract from the predominance of nerves which end there, or from the chief functions which the area performs. The motor locali-

zation seems to be the most perfect. Indeed, experimentation on the brains of monkeys has been successful in mapping out motor areas so accurately that such small centers as those connected with the bending of one particular leg or the flexing of a thumb have been located. Yet each area of the cortex is so connected with every other area by the millions of association fibers that the whole brain is capable of working together as a unit, thus unifying and harmonizing our thoughts, emotions, and acts.

The nervous system and the outside world.

Let us next inquire how this mechanism of the nervous system is acted upon in such a way as to give us sensations. In order to understand this, we must first know that all forms of matter are composed of minute atoms which are in constant motion, and by imparting this motion to the air or the ether which surrounds them, are constantly radiating energy in the form of minute waves throughout space. These waves, or radiations, are incredibly rapid in some instances and rather slow in others. In sending out its energy in the form of these waves, the physical world is doing its part to permit us to form its acquaintance. The end organs of the sensory nerves must meet this advance halfway, and be so constructed as to be affected by the different forms of energy which are constantly beating upon them.

The end organs and their response to stimuli.

Thus the radiations of ether from the sun, our chief source of light, are so rapid that billions of them enter the eye in a second of time, and the retina is of such a nature that its nerve cells are thrown into activity by these waves; the impulse is carried over the optic nerve to the occipital lobe of the cortex, and the sensation of sight is the result. The different colors also, from the red of the spectrum to the violet, are

the result of different vibration rates in the waves of ether which strike the retina; and in order to perceive color, the retina must be able to respond to the particular vibration rate which represents each color. Likewise in the sense of touch the end organs are fitted to respond to very rapid vibrations, and it is

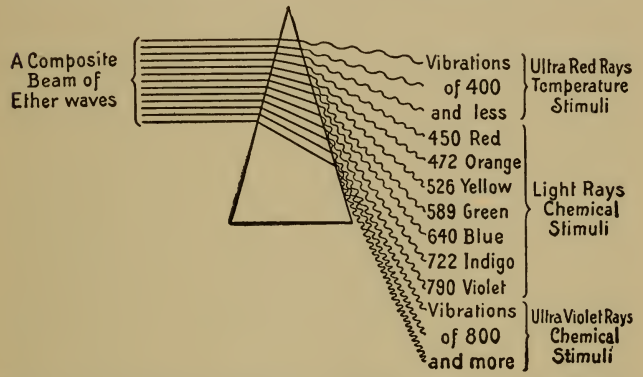

FIG. 14.—The prism's analysis of a bundle of light rays. On the right are shown the relation of vibration rates to temperature stimuli, to light, and to chemical stimuli. The rates are in billions per second.—After WITMER.

possible that the different qualities of touch are produced by different vibration rates in the atoms of the object we are touching. When we reach the ear, we have the organ which responds to the lowest vibration rate of all, for we can detect a sound made by an object which is vibrating from twenty to thirty times a second. The highest vibration rate which will affect the ear is some forty or fifty thousand per second. Thus it is seen that there are great gaps in the different rates to which our senses are fitted to respond —a sudden drop from billions in the case of the eye to millions in touch, and to thousands or even tens

in hearing. This makes one wonder whether there are not many things in nature which man has never discovered simply because he has not the sense mechanism enabling him to become conscious of their existence. There are undoubtedly more things in heaven and earth than are dreamt of in our philosophy.

Dependence of the mind on the senses.

Only as the senses bring in the material, has the mind anything with which to build. Thus have the senses to act as messengers between the great outside world and the brain; to be the servants who shall stand at the doorways of the body—the eyes, the ears, the finger tips—ready to receive each its particular kind of impulse from nature and send it along the right path to the part of the cortex where it belongs, so that the mind can say, "A sight," "A sound," or "A touch." Thus does the mind come to know the universe of the senses. Thus does it get the material out of which memory, imagination, and thought begin. Thus and only thus does the mind secure the crude material from which the finished superstructure is finally built.

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Thorndike, "Elements of Psychology," Chapters IX–XI.
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James, "Psychology," Briefer Course, Chapter VIII.
Angell, "Psychology," Chapter II.

CHAPTER IV

SENSORY AND MOTOR TRAINING

Education related to both mind and body.

EDUCATION was long looked upon as affecting the mind only. If what we have been saying about the dependence of the mind on the nervous system is true, however, it is evident that the mind cannot be trained *except as the nervous system is trained and developed.* For not sensation and movement alone, but memory, imagination, judgment, reasoning, and every other act of the mind, are dependent on the nervous system finally for their efficiency. The mind and the nervous system are so wedded in their growth and development, as well as in their activities, that it is impossible to educate the one without performing a like office for the other; and it is likewise impossible to neglect the one without causing the other to suffer.

Efficiency of nervous system depends on development and nutrition.

Ignoring the native differences in nervous systems through the influence of heredity, the efficiency of a nervous system is largely dependent on two factors: (1) The development of the cells and fibers of which it is composed, and (2) its general tone of health and vigor. The actual number of cells in the nervous system increases but little if at all after birth. Indeed, it is doubtful whether Edison's brain and nervous system has a greater number of cells in it than yours or mine. The difference between the brain of a genius and that of an ordinary man is not in the *number* of cells which it contains, but rather in the development

of the cells and fibers which are present, potentially, at least, in every nervous system. The histologist tells us that in the nervous system of every child there are tens of thousands of cells which are so immature and undeveloped that they are useless; indeed, this is the case to some degree in every adult person's nervous system as well. Thus each individual has inherent in his nervous system potentialities of which he has never taken advantage, the utilizing of which may make him a genius and the neglecting of which will certainly leave him on the plane of mediocrity. The first problem in education, then, is to take the unripe and inefficient nervous systems, and so develop them in connection with the growing mind that the possibilities which nature has stored in them shall become actualities.

Undeveloped cells.

Professor Donaldson tells us on this point that: "At birth, and for a long time after, many (nervous) systems contain cell elements which are more or less immature, not forming a functional part of the tissue, and yet under some conditions capable of further development. . . . For the cells which are continually appearing in the developing cortex no other source is known than the nuclei or granules found there in its earliest stages. These elements are metamorphosed neuroblasts—that is, elementary cells out of which the nervous matter is developed—which have shrunken to a volume less than that which they had at first, and which remain small until, in the subsequent process of enlargement necessary for their full development, they expand into well-marked cells. Elements intermediate between these granules and the fully developed cells are always found, even in mature brains, and therefore it is inferred that the latter are derived from the for-

mer. The appearances there also lead to the conclusions that many elements which might possibly develop in any given case is far beyond the number that actually does so. . . . The possible number of cells latent and functional in the central system is early fixed. At any age this number is accordingly represented by the granules as well as by the cells which have already undergone further development. During growth the proportion of developed cells increases, and sometimes, owing to the failure to recognize potential nerve cells in the granules, the impression is carried away that this increase implies the formation of new elements. As has been shown, such is not the case." [1]

Development of nerve fibers.

The nerve *fibers,* no less than the cells, must go through a process of development. It has already been shown that the fibers are the result of a branching of cells. At birth many of the cells have not yet thrown out branches, and hence the fibers are lacking; while many of those which are already grown out are not sufficiently developed to transmit impulses accurately. Thus it has been found that most children at birth are able to support the weight of the body for several seconds by clasping the fingers around a small rod, but it takes about a year for the child to become able to stand. It is evident that it requires more actual strength to cling to a rod than to stand; hence the conclusion is that the difference is in the earlier development of the nerve centers which have to do with clasping than of those concerned in standing. Likewise the child's first attempts to feed himself or do any one of the thousand little things about which he is so awkward, are partial failures not

[1] Donaldson, "The Growth of the Brain," pp. 74, 238.

so much because he has not had practice as because his nervous machinery connected with those movements is not yet developed sufficiently to enable him to be accurate. His brain is in a condition which Flechsig calls "unripe." How, then, shall the nervous system ripen? How shall the undeveloped cells and fibers grow to full maturity and efficiency?

Development of nervous system through use.

Like all other tissues of the body, the nerve cells and fibers are developed by judicious use. The sensory cells require the constant stimulus of nerve currents running in from the various end organs, and the motor cells require the constant stimulus of currents running from them out to the muscles. In other words, the conditions upon which both motor and sensory development depend are: (1) A rich environment of sights and sounds and tastes and smells, and everything else which serves as proper stimuli to the sense organs; and (2) no less important, an opportunity for the freest and most complete motor activity. An illustration of the effects of the lack of sensory stimuli on the cortex is well shown in the case of Laura Bridgman, whose brain was studied by Professor Donaldson after her death. Laura Bridgman was born a normal child, and developed as other children do up to the age of nearly three years. At this time, through an attack of scarlet fever, she lost her hearing completely and also the sight of her left eye. Her right eye was so badly affected that she could see but little; and it, too, became entirely blind when she was eight. She lived in this condition until she was sixty years old, when she died. Professor Donaldson submitted the cortex of her brain to a most careful examination, also comparing the corresponding areas on the two hemispheres with each other. He found that as a

whole the cortex was thinner than in the case of normal individuals. He found also that the cortical area connected with the left eye—namely, the right occipital region—was much thinner than that for the right eye, which had retained its sight longer than the other. He says: "It is interesting to notice that those parts of the cortex which, according to the current view, were associated with the defective sense organs were also particularly thin. The cause of this thinness was found to be due, at least in part, to the small size of the nerve cells there present. Not only were the large and medium-sized cells smaller, but the impression made on the observer was that they were also less numerous than in the normal cortex."

Effect of sensory stimuli.

No doubt if we could examine the brain of a person who has grown up in an environment rich in stimuli to the eye, where nature, earth, and sky have presented a changing panorama of color and form to attract the eye; where all the sounds of nature, from the chirp of the insect to the roar of the waves and the murmur of the breeze, and from the softest tones of the voice to the mightiest sweep of the great orchestra, have challenged the ear; where many and varied odors and perfumes have assailed the nostrils; where a great range of tastes have tempted the palate; where many varieties of touch and temperature sensations have been experienced—no doubt if we could examine such a brain we should find the sensory areas of the cortex excelling in thickness because its cells were well developed and full sized from the currents which had been pouring into them from the outside world. On the other hand, if we could examine a cortex which had lacked any one of these stimuli, we should find some area in it undeveloped because of this deficiency.

Its owner would therefore possess but the fraction of a brain, and would in a corresponding degree find his mind incomplete.

Necessity for motor activity.

Likewise in the case of the motor areas. Pity the boy or the girl who has been deprived of the opportunity to use every muscle to the fullest extent in the unrestricted plays and games of childhood. For

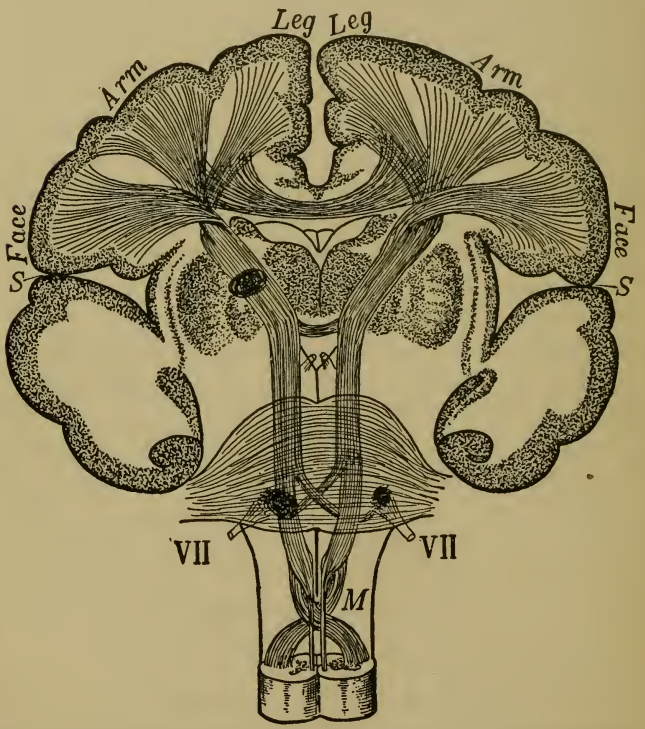

FIG. 15.—Schematic transverse section of the human brain showing the projection of the motor fibers, their crossing in the neighborhood of the medulla, and their termination in the different areas of localized function in the cortex. *S*, fissure of Sylvius; *M*, the medulla; VII, the roots of the facial nerves.—After ANGELL.

where such activities are not wide in their scope, there some areas of the cortex will remain undeveloped, because unused, and the person will be handicapped later in his life from lack of skill in the activities depending on these centers. Halleck says in this connection: "If we could examine the developing motor region with a microscope of sufficient magnifying power, it is conceivable that we might learn wherein the modification due to exercise consists. We might also, under such conditions, be able to say, 'This is the motor region of a piano player; the modifications here correspond precisely to those necessary for controlling such movements of the hand.' Or, 'This is the motor tract of a blacksmith; this, of an engraver; and these must be the cells which govern the vocal organs of an orator.'" Whether or not the microscope will ever reveal such things to us, there is no doubt that the conditions suggested exist, and that back of every inefficient and awkward attempt at physical control lies a motor area with its cells undeveloped by use. No wonder that our processes of learning physical adjustment and control are slow, for they are a growth in the brain rather than a simple "learning how."

Coördinate sensory and motor development.

The training of the nervous system consists finally, then, in the development of the neurons of which it is composed. We have seen that the sensory cells are to be developed by the sensory stimuli pouring in upon them, and the motor cells by the motor impulses which they send out to the muscles. The sensory and the motor fibers likewise, being an outgrowth of their respective cells, find their development in carrying the impulses which result in sensation and movement. Thus it is seen that the neuron is, in its development as in its work, a unit.

Development from thought processes.

To this simpler type of sensory and motor development which we have been considering, we must add that which comes from the more complex mental processes, such as memory, thought, and imagination. For it is in connection with these that the association fibers are developed, and the brain areas so connected that they can work together as a unit. A simple il-

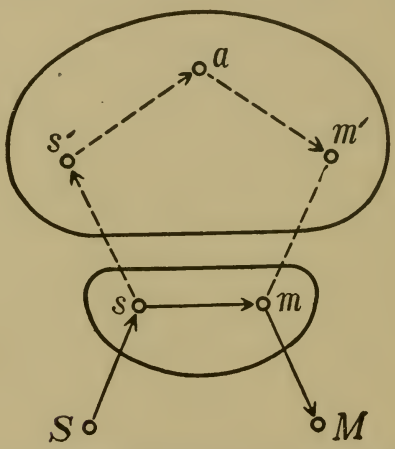

Fig. 16.—Diagram illustrating the paths of association.

lustration will enable us to see more clearly how the nervous mechanism acts to bring this about.

Illustration of simple sensory-motor action.

Suppose that I am walking along a country road deeply engaged in meditation, and that I come to a puddle of water in my pathway. I may turn aside and avoid the obstruction without my attention being called to it, and without interruption of my train of thought. The act has been automatic. In this case the nerve current has passed from the eye (S) over an afferent fiber to a sensory center (s) in the nervous system below the cortex; from there it has been for-

warded to a motor center (m) in the same region, and on out over a motor fiber to the proper muscles (M), which are to execute the required act. The act having been completed, the sensory nerves connected with the muscles employed report the fact back that the work is done, thus completing the circuit. This event may be taken as an illustration of literal thousands of acts which we perform daily without the intervention of consciousness, and hence without involving the hemispheres.

More complex action.

If, however, instead of avoiding the puddle unconsciously, I do so from considerations of the danger of wet feet and the disagreeableness of soiled shoes and the ridiculous appearance I shall make, then the current cannot take the short circuit, but must pass on up to the cortex. Here it awakens consciousness to take notice of the obstruction, and calls forth the images which aid in directing the necessary movements. This simple illustration may be greatly complicated, substituting for it one of the more complex problems which are continually presenting themselves to us for solution. But the truth of the illustration still holds. Whether in the simple or the complex act, there is always a forward passing of the nerve current through the sensory and thought centers, and on out through the motor centers to the organs which are to be concerned in the motor response.

The factors involved in an act.

Thus it will be seen that in the simplest act which can be considered there are the following factors: (1) The stimulus which acts on the end organ; (2) the ingoing current over an afferent nerve; (3) the sensory or interpreting cells; (4) the fibers connecting the sensory with a motor center; (5) the motor cells; (6) the efferent nerve to carry the direction for the

movement outward to the muscle; (7) the motor response; and, finally, (8) the report back that the act has been performed. With this in mind it fairly bewilders one to think of the marvelous complexity of the work that is going on in our nervous mechanism every moment of our life, even without considering the higher thought processes at all. How, with these added, the resulting complexity all works out into beautiful harmony is indeed beyond comprehension.

Application to education.

The great problem of education is, on the physical side, it would seem, then, to provide for ourselves and those we seek to educate as rich an environment of sensory stimuli as possible; one whose impressions will be full of suggestions to motor activity and to the higher thought processes; and then to give opportunity for thought and expression in the largest possible number of lines. And added to this must be frequent and clear sensory and motor recall, a living over again of the sights and sounds and odors and the motor activities we have once experienced. For in this way the nerve cells and fibers which were concerned in the original sensation or thought or movement are again brought into exercise, and their development continued. Through recall we are able not only greatly to multiply the effects of the immediate sensory and motor stimuli which come to us, but also to improve our power of thinking by getting a fund of images upon which the mind can draw.

Nutrition an important factor in brain efficiency.

As stated before, the second factor concerned in the efficiency of the nervous system is *vigor,* and this is largely dependent on nutrition. No amount of exercise, no matter how favorable the stimuli, can result in an efficient brain if the cells are starved for want of nourishment. No other tissue of the body is so

susceptible to fatigue and nutrition as are the nerve cells. Histologists find that the nuclei of nerve cells are shrunk as much as fifty per cent by extreme fatigue. For rapid and complete recuperation the cells must have not only the best of nourishment but opportunity for rest as well. Reasonable fatigue followed by proper recuperation is not harmful, but even necessary if the best development is to be attained; but fatigue without proper nourishment and rest is fatal to all mental operations, and indeed finally to the nervous system itself, leaving it permanently in a condition of low tone, and incapable of rallying to strong effort.

The factors in good nutrition.

For the best nutrition there is necessary first of all plenty of nourishing and healthful food. Science and experience have both disproved the supposition that students should be scantily fed. O'Shea claims that many brain workers are far short of their highest grade of efficiency because of starving their brains from poor diet. And not only must the food be of the right quality, but the body must be in good health. Little good to eat the best of food unless it is being properly digested and assimilated. And little good if all the rest is as it should be, and the right amount of oxidation does not go on in the brain so as to remove the worn out cells and make place for new ones. This warns us that pure air and a strong circulation are indispensable to the best working of our brains. No doubt many students who find their work too hard for them might locate the trouble in their stomachs or their lungs or the poor food they eat, rather than in their minds.

There is, perhaps, no greater foe to brain growth and efficiency than the nervous and worn out condi-

Necessity for sleep and freedom from worry.

tion which comes from loss of sleep or from worry. Experiments in the psychological laboratories have shown that nerve cells shrivel up and lose their vitality under loss of sleep. Let this go on for any considerable length of time, and the loss is irreparable; for the cells can never recuperate. This is especially true in the case of children or young people. Many school boys and girls, indeed many college students, are making slow progress in their studies not because they are mentally slow or inefficient, not even chiefly because they lose time that should be put on their lessons, but because they are incapacitating their brains for good service through loss of sleep and the consequent late hours. Add to this condition that of worry, which often accompanies it from the fact of failure in lessons, and a naturally good and well-organized nervous system is sure to fail. Worry, from whatever cause, should be avoided as one would avoid poison, if we would bring ourselves to the highest degree of efficiency. Not only does worry temporarily "unfit the mind for its best work," but its evil results are permanent, since the mind is left with a poorly developed or undone nervous system through which to work, even after the cause for worry has been removed and the worry itself has ceased.

EXERCISES

What different sensory stimuli can be obtained from a summer excursion to the woods?

Does everyone who takes such an excursion receive all these stimuli?

Will a sensory stimulus like that coming from the song of a bird produce the same effect on the cortex whether we

consciously hear the song or not? Consider also the question of sensory recall.

Have you ever tried to discover how many different colors and shades are discernible in some variegated landscape? How many different sounds you can detect on a summer evening? How many different qualities of touch you can determine by passing your fingers over various leaves?

What mental effects have you noticed from loss of sleep? from worry? from impure air? from insufficient exercise?

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Rowe, "The Physical Nature of the Child," Chapters IV–V.

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Hall, "Adolescence," Chapter III.

Stratton, "Experimental Psychology and Culture," Chapter XII.

Groos, "The Play of Man," Part I, Chapters I and II.

CHAPTER V

HABIT

The influence of habit.

"HABIT is second nature? Habit is ten times nature!" said Wellington. Habit is the "bane or the blessing" of our lives; our "best friend or our worst enemy"; the "cable which we cannot break." We are but "bundles of habits." So testify the wise men. Our lives are largely a daily round of activities dictated by our habits. Most of our movements and acts are habitual; we think as we have formed the habit of thinking; our moral judgments and decisions are tinged by habit; our religious exercises, even, may become largely a matter of habit.

Habit a method of economy.

And all this has its good side as well as its bad. If we could not form habits, we could improve but little in our ways of doing things, no matter how many times we did them over and over. We should have to go through the same bungling process of dressing ourselves as when we first learned it as children. Now the dressing does itself, and the mind is left free to deal with more important things. Were it not for habit, we should never find it possible to attend to some disagreeable task or follow an undesirable line of work without a severe and exhausting struggle over each separate case; we could never become able almost automatically to choose the right and shun the wrong without a battle. Every act that we perform would be a new act, and the wear and tear of

deciding afresh each time how this and that thing should be done would speedily exhaust our powers, and life would not be worth living; in fact, life except on the lowest plane would be impossible.

Physical habits.

Without habit, personality could not exist; for we could never do a thing twice alike, and hence would be a new person each succeeding moment. The acts which give us our own peculiar individuality are our habitual acts—the little things which do themselves moment by moment without care or attention, and are the truest and best expression of our real selves. Probably no one of us could be very sure which arm he puts into the sleeve, or which foot he puts into the shoe, first; and yet each of us certainly formed the habit long ago of doing these things in a certain way. We might not be able to describe just how we hold knife and fork and spoon, and yet each has his own characteristic and habitual way of handling them. We sit down and get up in some characteristic way, and the very poise of our heads and attitudes of our bodies are the result of habit. We get sleepy and wake up, become hungry and thirsty at certain hours, through force of habit. We form the habit of liking a certain chair, or nook, or corner, or path, or desk, and then seek this to the exclusion of all others. We habitually use a particular pitch of voice and type of enunciation in speaking, and this becomes one of our characteristic marks; or we form the habit of using barbarisms or solecisms of language in youth, and these cling to us and become an inseparable part of us later in life.

Mental habits.

On the mental side the case is no different. Our thinking is as characteristic as our physical acts. We may form the habit of thinking things out logically, or

of jumping to conclusions; of thinking critically and independently, or of taking things unquestioningly on the authority of others. We may form the habit of carefully reading good, sensible books, or of skimming sentimental and trashy ones; of choosing elevating, ennobling companions, or the opposite; of being a good conversationalist and doing our part in a social group, or of being a drag on the conversation, and needing to be entertained. We may form the habit of observing the things about us and enjoying the beautiful in our environment, or of failing to observe or to enjoy. We may form the habit of obeying the voice of conscience or of weakly yielding to temptation without a struggle; of taking a reverent attitude of prayer in our devotions, or of merely saying our prayers.

We must form habits.

I have said that we *may* form habits in all these lines, but that is not the way to put it; we *must* form habits in these and all other lines. It is not in our power to say whether we will form habits or not; for, once started, they go on forming themselves by day and night, steadily and relentlessly. Habit is, then, one of the great factors to be reckoned with in our lives, and the question becomes not Shall we form habits? but *what habits we shall form.* And we have the determining of this question largely in our own power, for habits do not just happen, nor do they come to us ready made. We ourselves make them from day to day through the acts we perform, and in so far as we have control over our acts, in that far we can determine our habits.

Habit has a physical basis.

Habit is to be explained from the standpoint of its physical basis. Habits are formed because the tissues of our bodies are capable of being modified by use, and

of so retaining the effects of this modification that the same act is easier of performance each succeeding time. This results in the old act being repeated instead of a new one being selected, and hence the old act is perpetuated.

Even dead and inert matter obeys the same principles in this regard as does living matter. Says M. Leon Dumont: "Everyone knows how a garment, having been worn a certain time, clings to the shape of the body better than when it was new; there has been a change in the tissue, and this change is a new habit of cohesion; a lock works better after having been used some time; at the outset more force was required to overcome certain roughness in the mechanism. The overcoming of their resistance is a phenomenon of habituation. It costs less trouble to fold a paper when it has been folded already. This saving of trouble is due to the essential nature of habit, which brings it about that, to reproduce the effect, a less amount of the outward cause is required. The sounds of a violin improve by use in the hands of an able artist, because the fibers of the wood at last contract habits of vibration conformed to harmonic relations. This is what gives such inestimable value to instruments that have belonged to great masters. Water, in flowing, hollows out for itself a channel, which grows broader and deeper; and, after having ceased to flow, it resumes when it flows again the path traced for itself before. Just so, the impressions of outer objects fashion for themselves in the nervous system more and more appropriate paths, and these vital phenomena recur under similar excitements from without, when they have been interrupted for a certain time." [1]

[1] Quoted by James, "Psychology," Briefer Course, p. 135.

Living tissue readily forms habits.

What is true of inanimate matter is doubly true of living tissue. The tissues of the human body can be molded into almost any form you choose if taken in time. A child may be placed on his feet at too early an age, and the bones of his legs form the habit of remaining bent. The Flathead Indian binds a board on the skull of his child, and its head forms the habit of remaining flat on the top. Wrong bodily postures produce curvature of the spine, and pernicious modes of dress deform the bones of the chest. The muscles may be trained into the habit of keeping the shoulders straight or letting them droop; those of the back, to keep the body well up on the hips, or to let it sag; those of locomotion, to give us a light, springy step, or to allow a shuffling carriage; those of speech, to give us a clear-cut, accurate articulation, or a careless, halting one; and those of the face, to give us a cheerful cast of countenance, or a glum and morose expression.

Nerve tissue most susceptible to habit.

But the nervous tissue is the most sensitive and easily molded of all the bodily tissues. So delicate is the organization of the brain structure and so unstable its molecules, that even the perfume of the flower, which assails the nose of a child, the song of a bird, which strikes his ear, or the fleeting dream, which lingers but for a second in his sleep, has so modified his brain that it will never again be as if these things had not been experienced. Every sensory current which runs in from the outside world; every motor current which runs out to command a muscle; every thought which we think, has so modified the nerve structure through which it acts, that a tendency remains for a like act to be repeated. Our brain and nervous system is daily being molded into fixed

habits of acting by our thoughts and deeds, and thus becomes the automatic register of all we do.

Our nervous systems keep an indelible record of our acts.

The old Chinese fairy story hits upon a fundamental and vital truth. These celestials tell their children that each child is accompanied by day and by night, every moment of his life, by an invisible fairy, who is provided with a pencil and tablet. It is the duty of this fairy to put down every deed of the child both good and evil, in an indelible record which will one day rise as a witness against him. So it is in very truth with our brains. The wrong act may have been performed in secret, no living being may ever know that we performed it, and a merciful Providence may forgive it; but the inexorable monitor of our deeds was all the time beside us writing the record, and the history of that act is inscribed forever in the tissues of our brain. It may be repented of bitterly in sackcloth and ashes and be discontinued, but its effects can never be quite effaced; they will remain with us as a handicap till our dying day, and in some critical moment in a great emergency we shall be in danger of defeat from the effects of that long past and forgotten act.

Hence the importance of training them aright.

Education consists in large part in "making our nervous system our ally instead of our enemy." And any youth who is forming a large number of useful habits is receiving no mean education, no matter if his knowledge of books may be limited; on the other hand, no one who is forming a large number of bad habits is being well educated, no matter how brilliant his knowledge may be.

Youth the time for habit-forming.

Childhood and youth is the great time for habit-forming. Then the brain is plastic and easily molded, and it retains its impressions more indelibly; later

it is hard to modify, and the impressions made are less permanent. It is hard to teach an old dog new tricks; nor would he remember them if you could teach them to him, nor be able to perform them well even if he could remember them. The young child will, within the first few weeks of its life, form habits of sleeping and feeding. It may in a few days be led into the habit of sleeping in the dark, or of requiring a light; of going to sleep lying quietly, or of insisting upon being rocked; of getting hungry by the clock, or of wanting its food at all times when it finds nothing else to do, and so on. It is wholly outside the power of the mother or the nurse to determine whether the child shall form habits, but largely within their power to say what habits shall be formed, since they control his acts. As the child grows older, the range of his habits increases; and by the time he has reached his middle teens, the greater number of his personal habits are formed. It is very doubtful whether a boy who has not formed habits of punctuality before the age of fifteen will ever be entirely trustworthy in matters requiring precision in this line. The girl who has not, before this age, formed habits of neatness and order will hardly make a tidy housekeeper later in her life. Those who in youth have no opportunity to habituate themselves to the usages of society may study books on etiquette and employ private instructors in the art of polite behavior all they please later in life, but they will never cease to be awkward and ill at ease. None are at a greater disadvantage than the suddenly-grown-rich who attempt late in life to surround themselves with articles of art and luxury though their habits were all formed amid barrenness and want during their earlier years.

What youth does not dream of being great, or noble, or a celebrated scholar! And how few there are who finally achieve their ideals! Where does the cause of failure lie? Surely not in the lack of high ideals. Multitudes of young people have "Excelsior!" as their motto, and yet never get started up the mountain slope, let alone toiling on to its top. They have put in hours dreaming of the glory farther up, *and have never begun to climb.* The difficulty comes in not realizing that the only way to become what we wish or dream that we may become is *to form the habit of being that thing.* To form the habit of achievement, of effort, of self-sacrifice, if need be. To form the habit of deeds along with dreams; to form the habit of *doing.*

Value of the habit of achievement.

Who of us has not at this moment lying in wait for his convenience in the dim future a number of things which he means to do just as soon as this term of school is finished, or this job of work is completed, or when he is not so busy as now? And how seldom does he ever get to these things at all! Darwin tells that in his youth he loved poetry, art, and music, but was so busy with his scientific work that he could ill spare the time to indulge these tastes. So he promised himself that he would devote his time to scientific work and make his mark in this. Then he would have time for the things that he loved, and would cultivate his taste for the fine arts. He made his mark in the field of science, and then turned again to poetry, to music, to art. But alas! they were all dead and dry bones to him, without life or interest. He had passed the time when he could ever form the taste for them. He had formed his habits in another direction, and now it was forever too late to

We must daily be what we would become.

form the new habits anew. His own conclusion is, that if he had his life to live over again, he would each week listen to some musical concert and visit some art gallery, and that each day he would read some poetry, and thereby keep alive and active the love for them.

Habit economizes effort.

Habit is a means by which we may economize effort. To have to decide each time the question comes up whether we will attend to this lecture or sermon or lesson; whether we will persevere and go on through this piece of disagreeable work which we have begun; whether we will go to the trouble of being courteous and kind to this or that poor or unlovely or dirty fellow-mortal; whether we will take this road because it looks easy, or that one because we know it to be the one we ought to take; whether we will be strictly fair and honest when we might just as well be the opposite; whether we will resist the temptation which dares us; whether we will do this duty, hard though it is, which confronts us—to have to decide each of these questions every time it presents itself is to put too large a proportion of our thought and energy on things which should take care of themselves. For all these things should early become so nearly habitual that they can be settled with the very minimum of expenditure of energy when they arise.

And renders us more efficient.

It is a noble thing to be able to attend by sheer force of will when the interest lags, or some more attractive thing appears, but far better is it to have so formed the habit of attention that we naturally fall into that attitude when this is the desirable thing. To understand what I mean, you have but to look over a class or an audience and note the different ways which people have of finally settling down to listening. Some

with an attitude which says, "Now here I am, ready to listen to you if you will interest me, otherwise not." Others with a manner which says, "Now I did not really come here expecting to listen, and you will have a large task if you interest me; I never listen unless I am compelled to, and the responsibility rests on you." Others plainly say, "I really mean to listen, but I have hard work to control my thoughts, and if I wander I shall not blame you altogether; it is just my way." And still others say, "When I am expected to listen, I always listen whether there is anything much to listen to or not. I have formed that habit, and so have no quarrel with myself about it. You can depend on me to be attentive, for I cannot afford to weaken my habit of attention whether you do well or not." Every speaker will clasp these last listeners to his heart and feed them on the choicest thoughts of his soul; they are the ones to whom he speaks and to whom his address will appeal.

Habit enables us to meet the disagreeable,

To be able to persevere in the face of difficulties and hardships and carry through the disagreeable thing in spite of the protests of our natures against the sacrifice which it requires, is a creditable thing; but it is more creditable to have so formed the habit of perseverance that the disagreeable duty shall be done without a struggle, or protest, or question. Horace Mann testifies of himself that whatever success he was able to attain was made possible through the early habit which he formed of never stopping to inquire whether he *liked* to do anything which needed doing, but of doing everything equally well and without question, both the pleasant and the unpleasant.

The youth who can fight out a moral battle and win

And may be used to place us on safer moral ground.

against the allurements of some attractive temptation is worthy the highest honor and praise; but so long as he has to fight the same battle over and over again, he is on dangerous ground morally. For good morals must finally become habits, so ingrained in us that the right decision comes largely without effort and without struggle. Otherwise the strain is too great, and defeat will occasionally come; and defeat means weakness and at last disaster, after the spirit has tired of the constant conflict. And so on in a hundred lines. Good habits are more to be coveted than individual victories in special cases, much as these are to be desired. For good habits mean victories all along the line.

Even good habits need to be modified.

But even in good habits there is a danger. Habit is the opposite of attention. Habit relieves attention of unnecessary strain. Every habitual act was at one time, either in the history of the race or of the individual, a voluntary act; that is, it was performed under active attention. As the habit grew, attention was gradually rendered unnecessary, until finally it dropped entirely out. And herein lies the danger. Habit once formed has no way of being modified unless in some way attention is called to it, for a habit left to itself becomes more and more firmly fixed. The rut grows deeper. In very few, if any, of our actions can we afford to have this the case. Our habits need to be progressive, they need to grow, to be modified, to be improved. Otherwise they will become an incrusting shell, fixed and unyielding, which will limit our growth.

This is to be accomplished through attention.

It is necessary, then, to keep our habitual acts under some surveillance of attention, to pass them in review for inspection every now and then, that we

may discover possible modifications which will make them more serviceable. We need to be inventive, to find out constantly better ways of doing things, to avoid ruts.

A good illustration of what I mean is found in the way some play tennis. At first every act is a voluntary act directed by the mind. The playing is awkward and ineffective. Finally, the drives, the lobs, and the cuts become more or less habitual, and can be performed much better without conscious attention to every move than with it. And thus far habit is necessary and desirable. But here the multitude of tennis players stop. Only the few go on, and these last are the champions. They are the ones who make use of habit just as others do, but who constantly direct their attention to improving their drives and lobs and cuts, and so do not fall into a rut and continue playing season after season no better this than last. Mere repetition will form habit, but the habit formed will not be an intelligent habit, and hence will lead to stagnation.

James's three maxims for habit-forming.

On the forming of new habits and the leaving off of old ones, I know of no better statement than that of James, based on Bain's chapter on "Moral Habits." I quote this statement at some length: "In the acquisition of a new habit, or the leaving off of an old one, we must take care to *launch ourselves with as strong and decided an initiative as possible.* Accumulate all the possible circumstances which shall reënforce right motives; put yourself assiduously in conditions that encourage the new way; make engagements incompatible with the old; take a public pledge, if the case allows; in short, develop your resolution with every aid you know. This will give your new

1. Decided initiative.

beginning such a momentum that the temptation to break down will not occur as soon as it otherwise might; and every day during which a breakdown is postponed adds to the chances of its not occurring at all.

2. No exception to be allowed.

"The second maxim is: *Never suffer an exception to occur until the new habit is securely rooted in your life.* Each lapse is like letting fall a ball of string which one is carefully winding up; a single slip undoes more than a great many turns will wind again. *Continuity* of training is the great means of making the nervous system act infallibly right. . . . The need of securing success nerves one to future vigor.

3. Act in the new line.

"A third maxim may be added to the preceding pair: *Seize the very first possible opportunity to act on every resolution you make, and on every emotional prompting you may experience in the direction of the habits you aspire to gain.* It is not in the moment of their forming, but in the moment of their producing *motor effects*, that resolves and aspirations communicate the new 'set' to the brain."[1]

The value of our habits depends on the character of our acts.

And finally, let no one be disturbed or afraid because in a little time you become a "walking bundle of habits." For in so far as your good actions predominate over your bad ones, that much will your good habits outweigh your bad habits. Silently, moment by moment, efficiency is growing out of all worthy acts well done. Every bit of heroic self-sacrifice, every battle fought and won, every good deed performed, is being irradicably credited to you in your nervous system, and will finally add its mite toward achieving the success of your ambitions.

[1] "Psychology," vol. i, pp. 123, 124; also, "Briefer Course," p. 145.

EXERCISES IN INTROSPECTION

Select some act which you have recently begun to perform and watch it grow more and more habitual. Notice carefully for a week and see whether you do not discover some habits which you did not know you had. Make a catalogue of your bad habits; of the most important of your good ones.

Set out to form some new habit which you desire to possess; also to break some undesirable habit, watching carefully what takes place in both cases, and how long it requires.

If habits have a tendency to keep on growing stronger, how does it come that we ever break them?

Is it better to break a bad habit abruptly or by degrees?

Why are habits formed in youth so much harder to break than those formed later in life?

How important a part do you think habit plays in determining a man's success or failure in life?

Can you distinguish between mental and physical habits?

SUGGESTED READINGS

Royce, "Outlines of Psychology," Chapter VIII.

James, "Psychology," Briefer Course, Chapter X.

James, "Talks to Teachers," Chapter VIII.

Angell, "Psychology," Chapter III.

Oppenheim, "Mental Growth and Control," Chapter VII.

Rowe, "The Physical Nature of the Child," Chapters X and XI.

CHAPTER VI

SENSATION AND PERCEPTION

The constant appeal to our senses from external stimuli.

THE great world of nature without and the mind within, our material environment on the one hand and the means of knowing it on the other, how is the introduction brought about and the acquaintance continued? The diversified landscape of field and wood, our companions who sit about us, the familiar objects in the room, the pictures on the walls, the statuary, the books lying open before us; the twitter of the birds, the ringing of a distant bell, the roar of a train, the chatter of voices outside, the drone of insects, and a host of other familiar sounds; the touch of the soft breeze upon the cheek, the silken ribbon stroked with the fingers, the contact of seat and clothing, the feel of some rough or hard object in the hand; the warmth of the room, the coldness of the metal on the seat; the sour of the apple, the sweet of the candy; the delicate perfume of the bouquet; the organic sensations from our own bodies—all these are an appeal to the mind to be known by it.

From these stimuli the mind constructs its world of objects.

And we come by this knowledge so gradually and unconsciously that the most marvelous appears to us as commonplace, and we take for granted many things which it would puzzle us to explain. We say, "Of course I see yonder green tree: it is about ten rods distant." But why "of course"? Why should objects at a distance from us and with no evident connection between us and them be known to us at all

merely by turning our eyes in their direction when there is light? Why not rather say with the blind son of Professor Puiseaux, of Paris, who, when asked if he would like to be restored to sight, answered: "If it were not for curiosity I would rather have long arms. It seems to me that my hands would teach me better what is passing in the moon than your eyes or telescopes."

Illustrations from the various senses.

We listen and then say, "Yes, that is a certain bell ringing in the neighboring village," as if this were the most simple thing in the world. But why should one piece of metal striking against another a mile or two away make us aware that there is a bell there at all, let alone that it is a certain bell whose tone we recognize? Or we pass our fingers over a piece of cloth and decide, "That is silk." But why, merely by placing our skin in contact with a bit of material, should we be able to know its quality, much less that it is cloth and that its threads were originally spun by an insect? Or we take a sip of liquid and say, "This milk is sour." But why should we be able by taking the liquid into the mouth and bringing it into contact with the mucous membrane be able to tell that it is milk, and that it possesses the quality which we call *sour?* Or, once more, we get a whiff of air through the open window in the springtime and say, "There is a lilac bush in bloom on the lawn." Yet why, from inhaling air containing particles of lilac, should we be able to know that there is anything outside, much less that it is a flower and of a particular variety which we call lilac? Or, finally, we hold a heated flatiron up near the cheek and say, "This is too hot! it will burn the cloth." But why by holding this object a foot away from the face do we know

that it is there, let alone knowing its temperature? Let us seek an answer.

The senses are aided by reason.

Some of the outside world we know only as we come into immediate and direct contact with it, as in the case of taste and smell and touch. Other parts of it we can know at a distance, as in sight and hearing and temperature. Nor is the one fact more wonderful than the other. The marvel first of all is that the great world outside of the mind is knowable to it through the gateways of the body which we call the senses. And further that, after we come to know a sufficient part of the world by means of the senses, and have come to see the relation existing between the known parts, we can then go on through thought to discover still other parts of it without the use of the senses at all. The astronomer La Verrier could sit in his study and, after a long series of computations and calculations, write to his brother astronomers who had better telescopes than he, "If you will turn your telescopes to a certain spot in the heavens on the night I shall tell you, you will there discover a new planet which has never yet been seen by man." And sure enough it was there, unerringly located by man's reason where his senses could not reach.

Knowledge obtained through the various senses is unified.

Further, our senses come through experience to have the power of trading knowledge, by which each puts its knowledge at the disposal of the others. Thus we take a glance out of the window and say that the day looks cold, although we well know that we cannot see *cold*. Or we say that the melon sounds green, or the bell sounds cracked, although a *crack* or *greenness* cannot be heard. Or we say that the box feels empty, although *emptiness* cannot be felt. We have come to associate cold, originally experienced with

days which look like the one we now see, with this particular appearance, and so we say we see the cold; sounds like the one coming from the bell we have come to associate with cracked bells, and that coming from the melon with green melons, until we say unhesitatingly that the bell sounds cracked and the melon sounds green. And so with the various senses. Each gleans from the world its own particular bit of knowledge, but all are finally in a partnership, and what is each one's knowledge belongs to every other one in so far as the other can use it.

The sensory processes.

The explanation of the ultimate nature of knowledge, and how we reach it through contact with our material environment, we will leave to the philosophers. And battles enough they have over the question, and still others they will have before the matter is settled. The easier and more important problem for us is to describe the *processes* by which the mind comes to know its environment, and to see how it uses this knowledge in thinking. This much we shall be able to do, for it is often possible to describe a process and discover its laws even when we cannot fully explain its nature and origin. We know the process of digestion and assimilation, and the laws which govern them, although we do not understand the ultimate nature and origin of *life* which makes these possible.

The qualities of objects exist in the mind.

Yet even in the relatively simple description which we have proposed many puzzles will confront us, and one of them appears at the very outset. This is that the qualities which we usually ascribe to objects really exist in our own minds and not in the objects at all. Take, for instance, the common qualities of light and color. The physicist tells us that what we see as

light is occasioned by an incredibly rapid beating of ether waves on the retina of the eye. All space is filled with this ether; and when it is light—that is, when some object like the sun or other light-giving body is present—the ether is set in motion by the vibrating molecules of the body that is the source of light, its waves strike the retina, a current is produced and carried to the brain, and we see light. This means, then, that space, the medium in which we see objects, is not filled with light, but with very rapid waves of ether, and that the light which we see really exists but in our own minds as the mental response to the physical stimulus of ether waves. Likewise with color. Color is produced by ether waves of different lengths and degrees of rapidity. Thus ether waves at the rate of 450 billions a second give us the sensation of red; of 472 billions a second, orange; of 526 billions a second, yellow; of 589 billions a second, green; of 640 billions a second, blue; of 722 billions a second, indigo; of 790 billions a second, violet. What exists outside of us, then, is these ether waves of different rates, and not the colors themselves. The beautiful yellow and crimson of a sunset, the variegated colors of a landscape, the delicate pink in the cheek of a child, the blush of a rose, the shimmering green of the lake—these reside not in the objects themselves, but in the consciousness of the one who sees them. The objects possess but the quality of reflecting back to the eye ether waves of the particular rate corresponding to the color which we ascribe to them. Thus "red" objects reflect back ether waves of a rate of 450 billions a second, and no others; "white" objects reflect all rates; "black" objects reflect none.

Light and color.

Sound, etc.

The case is no different with regard to sound. When we speak of a sound coming from a bell, what we really mean is that the vibrations of the bell have set up waves in the air between it and our ear, which have produced corresponding vibrations in the ear; that a nerve current was thereby produced; and that a sound was heard. But the sound is a mental thing, and exists only in our own consciousness. What passed between the sounding object and ourselves was not sound, but waves in the intervening air, ready to be transferred through the machinery of nerves and brain into the beautiful tones and melodies and harmonies of the mind. And so with all other sensations. What exists outside of us is a *stimulus* of a kind suitable to excite to activity a certain end organ of taste, or touch, or smell, or sight, or hearing; what exists within us is the *nervous machinery* capable of converting this stimulus into a nerve current which shall produce an activity in the cortex of the brain; what results is the *mental object* which we call a *sensation* of taste, smell, touch, sight, or hearing.

Nor ought these facts to make nature seem the less wonderful to us. For it is certainly no less marvelous for nature to be able so to act on the nervous system that sensations shall result in the mind than it would be for the objects to possess such qualities as color themselves instead of these existing in our consciousness. On the other hand, a certain dignity is added to the mind when we think that it is not merely able to know light and color and sound and all the rest belonging to objects external to itself, but is able even to interpret vibrations of energy coming from these objects, and translate them into various sensations.

Sensation the simplest form of knowledge.

The simplest bit of knowledge which the mind can get is a sensation. Yet it is impossible to define a sensation in any exact way; and in actual life a sensation is never experienced by itself, but is always merged in some perception in which it plays a part. To quote James: "All we can say on this point is that *what we mean by sensations are first things in the way of consciousness.* They are the *immediate* results upon consciousness of nerve currents as they enter the brain, and before they have awakened any suggestions or associations with past experience. But it is obvious that *such immediate sensations can be realized only in the earliest days of life.*" Very soon memories and associations become coupled with the sensations, and after that all succeeding sensations awaken vestiges of former impressions, and perception is beginning to develop.

Sensations give us not objects but qualities.

Indeed, unrelated sensations by themselves would be wholly inadequate to give us either a continuous consciousness or a knowledge of the material world about us. I might see an orange and get its color; smell it and get its odor; put it into my mouth and get its taste; touch it with my hands and get a sensation of contact, pressure, and temperature; lift it and get its weight; drop it and get its sound as it falls. But if this were all, I should never know the *orange* at all. If each one of these separate bits of knowledge had to remain forever separate from the others, I should know a list of *qualities*, but have no knowledge of the *thing* to which they belonged. It is only by getting all the qualities of an object through as many different sensations as possible and then knowing them all together in relation to this object that we can ever come to know it as an object. It is in this way, through

a multiplicity of unified *experiences*, that we build up the material world of our environment. And all such experience, once gained, assists in still further acquisition.

Meager knowledge from sight alone.

The uncertainty of knowledge gained through sensation unaided by experience is shown in the case of persons born blind and in later years restored to sight. Murray tells of the case of a boy born with a cataract of so opaque a quality that he could detect no objects of sight. When he was fourteen years old the cataract was removed by Cheselden. At first he "thought that all objects he saw touched his eyes as those he felt did his skin." Pictures appeared to him "only parti-colored plains or surfaces diversified with a variety of paints." For several months he had no information that they represented solid bodies. Then he expected them to feel solid to his hand as they looked to his eye, and was much amazed that they felt flat when he passed his hand over them. He asked which was the lying sense, feeling or seeing. Another youth, blind from birth, was cured at eighteen. "When the patient first acquired the faculty of sight all objects appeared so near that he was sometimes afraid of coming in contact with them, though they were in reality a great distance from him. . . . All objects appeared to him perfectly flat. Thus, although he very well knew by his touch that the nose was prominent and the eyes sunk deeper in the head, he saw a human face as a plane. . . . And he was continually obliged to have recourse to the sense of touch." It is a matter of common experience for persons of normal vision to find themselves unable to judge of distance when the object lacks some of its usual associates, as when a mountain is seen across

a wide plain, or an object appears on the horizon at sea. In the case of hearing, most of us have at some time been deceived into thinking that some faint sound near at hand was a louder one farther away, like mistaking the hum of a mosquito for the whistle of a distant locomotive. And probably none of us, if we are careful to exclude all odors by plugging the nostrils with cotton, can by taste distinguish between scraped apple, potato, turnip, or beet, or can tell hot milk from tea or coffee of the same temperature.

Sight alone gives us only light and color.

The sensation of sight, left unaided, gives us but two qualities, *light* and *color*. The eye can distinguish many grades of light from purest white on through the various grays to the densest black. The range is greater still in color. We speak of the seven colors of the spectrum, violet, indigo, blue, green, yellow, orange, and red; but if we count all the color tones lying between these colors, the number is multiplied immensely. Herschel estimated that the workers on the mosaics at Rome must have distinguished 30,000 different color tones. But having given us this large number of qualities in color and light, the eye gives us nothing else through pure sensation. Knowledge of distance, size, and form, which seems so natural to the eye, had to be acquired through experience and borrowing from the other senses.

Hearing gives us tones and noises.

The sensation of sound likewise gives us two qualities: namely, *tones* with their accompanying pitch and *timbre*, and *noises*. Tones, or musical sounds, are produced by isochronous or equal-timed vibrations; thus, *C* of the first octave is produced by 256 vibrations a second, and if this tone is prolonged the vibration rate will continue uniformly the same. Noises,

on the other hand, are produced by vibrations which have no uniformity of vibration rate. The ear's sensibility to pitch extends over about seven octaves. The seven-octave piano goes down to 27½ vibrations, and reaches up to 3,500 vibrations. Notes of about 50,000 can be heard by an average ear, however; but these are too painfully shrill to be musical. Taking into account this upper limit, the range of the ear is about eleven octaves. The ear, having given us *loudness*, which depends on the amplitude of the vibrations, *pitch*, which depends on the rapidity of the vibrations, and *timbre*, or *quality*, which depends on the complexity of the tones, has no further information through sensation alone.

The four taste qualities.

The sense of taste recognizes the four qualities of *sour*, *sweet*, *salt*, and *bitter*. Many of the qualities which we improperly call tastes are in reality a complex of taste, smell, touch, and temperature. Smell contributes so largely to the sense of taste that many articles of food become " tasteless " when we have a catarrh, and many nauseating doses of medicine can be taken without discomfort if the nose is held.

Sensation of smell.

The sensations of smell have not been classified so well as those of taste, and we have no distinct names for them. The only definite classification is that based on their pleasantness or the opposite. We also borrow a few terms and speak of *sweet* or *fragrant* perfumes, and *fresh* or *close* smells. It is perfectly evident when we observe animals, or even primitive men, that the human race has been evolving greater sensibility to odor, while at the same time there has been a loss of keenness of scent.

Cutaneous or skin sensation may arise from either *mechanical* stimulation, such as pressure, a blow, or

Sensations from the skin.

tickling, or from *thermal* stimulation from hot or cold objects. Stimulated mechanically, the skin gives us but two sensation qualities, *pressure* and *pain*. Many of the qualities which we commonly ascribe to the skin sensations are really a complex of cutaneous and muscular sensations. *Contact* is light pressure. *Hardness* and *softness* depend on the intensity of the pressure. *Roughness* and *smoothness* arise from interrupted and continuous pressure, respectively, and require movement over the rough or smooth surface.

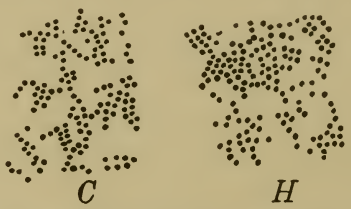

FIG. 17.—Diagram showing distribution of hot and cold spots on the back of the hand. *C*, cold spots; *H*, hot spots.

Touch depends on pressure accompanied by the muscular sensations involved in the movements connected with the act. Pain is clearly a different sensation from pressure; but any of the cutaneous or muscular sensations may, by excessive stimulation, be made to pass over into pain. All parts of the skin are sensitive to pressure and pain; but certain parts, like the finger tips and the tip of the tongue, are more highly sensitive than others. The skin varies also in its sensitivity to *heat* and *cold*. If we take a hot or a very cold pencil point and pass it rather lightly and slowly over the skin, it is easy to discover certain spots from which a sensation of warmth or of cold flashes out. In this way it is possible to locate the end organs of

temperature almost as accurately as those of hearing or of sight.

Muscle and joint sensations.

The muscles, tendons, and joints also give rise to perfectly definite sensations, but they have not been named as have the sensations from most of the other end organs. *Weight* is the most clearly marked of these sensations. It is through the sensations connected with movements of muscles, tendons, and joints that we come to judge *form, size,* and *distance.*

Organic sensations.

Finally, to the sensations mentioned so far must be added those which come from the internal organs of the body. From the alimentary canal we get the sensations of *hunger, thirst,* and *nausea;* from the heart, lungs, and certain other organs come numerous well-defined but unnamed sensations which play an important part in making up the feeling-tone of our daily lives.

The raw material of knowledge furnished by the senses.

Thus we see that the senses may be looked upon as the sentries of the body, standing at the outposts where nature and ourselves meet. They discover the qualities of the various objects with which we come in contact and hand them over to the mind in the form of sensations. And these sensations are the raw material out of which we begin to construct the wonderful world of our material environment.

The richness and complexity of our material environment.

This world which we enter through the gateways of the senses is more marvelous by far than any fairy world created by the fancy of story-tellers. For it contains the elements of all they have conceived and much more besides. It is more marvelous than any structure planned and executed by the mind of man, for all the wonders and beauties of the Coliseum or of St. Peter's existed in nature before they were discovered by the architect and thrown together in

those magnificent structures. The material advancement of civilization has been but the discovery of the objects, forces, and laws of nature, and their use in inventions serviceable to men. And these forces and laws of nature were discovered only as they were made manifest through objects in the material world.

Its meaning.

The problem lying before each individual who would enter fully into this rich world of environment, then, is to discover just as large a part of the material world about him as possible. In the most humble environment of the most uneventful life is to be found the material for discoveries and inventions yet undreamed of. Lying in the shade of an apple tree under the open sky, Newton read from a falling apple the fundamental principles of the laws of gravitation which have revolutionized science; sitting at a humble tea table, Watt watched the gurgling of the steam escaping from the kettle, and evolved the steam engine therefrom; with his simple kite, Franklin drew down the lightning from the clouds, and started the science of electricity; through studying a ball, the ancient scholars conceived the earth to be a sphere, and Columbus discovered America.

The problem which confronts the child.

Well it is that the child, starting his life's journey, cannot see the magnitude of the task before him. Cast amid a world of objects of whose very existence he is ignorant, and whose meaning and uses have to be learned by slow and often painful experience, he proceeds step by step through the senses in his discovery of the objects about him. Yet, considered again, we ourselves are after all but a step in advance of the child. Though we are somewhat more familiar with the use of our senses than he, and know a few more objects about us, yet the knowledge of the wisest

of us is at best pitifully meager compared with the richness of nature. So impossible is it for us to know all our material environment, that men have taken to becoming specialists. One man will spend his life in the study of a certain variety of plants, while there are hundreds of thousands of varieties all about him; another will study a particular kind of animal life, perhaps too minute to be seen with the naked eye, while the world is teeming with animal forms which he has not time in his short day of life to stop to examine; another will study the land forms and read the earth's history from the rocks and geological strata, but here again nature's volume is so large that he has time to read but a small fraction of the whole. Another studies the human body and learns to read from its expressions the signs of health and sickness, and to prescribe remedies for its ills; but in this field also he has found it necessary to divide the work, and so we have specialists for almost every organ of the body.

How the child proceeds.

How, then, do we proceed to the discovery of this world of objects? Let us watch the child and learn the secret from him. Give the babe a ball, and he applies every sense to it to discover its qualities. He stares at it, he takes it in his hands and turns it over and around, he lifts it, he strokes it, he punches and jabs it, he puts it to his mouth and bites it, he drops it, he throws it and creeps after it. He leaves no stone unturned to find out what that thing really is. By means of the *qualities* which come to him through the avenues of sense, he constructs the *object*. And not only does he come to know the ball as a material object, but he comes to know also its uses. He is forming his own best definition of a ball in terms of the

Through qualities of objects.

sensations which he gets from it and the uses to which he puts it, and all this even before he can name it or is able to recognize its name when he hears it. How much better his method than the one he will have to follow a little later when he goes to school and learns that "A ball is a spherical body of any substance or size, used to play with, as by throwing, kicking, or knocking, etc!"

We proceed as does the child.

Nor is the case in the least different with ourselves. When we wish to learn about a new object or discover new facts about an old one, we do precisely as the child does if we are wise. We apply to it every sense to which it will afford a stimulus, and finally arrive at the object through its various qualities. And just in so far as we have failed to use in connection with it every sense to which it can minister, just in that degree will we have an incomplete perception of it. Indeed, just so far as we have failed finally to perceive it in terms of its functions or uses, in that far also have we failed to know it completely. Tomatoes were for many years grown as an ornamental garden plant before it was discovered that tomatoes could minister also to the taste as well as to the sight. The clothing of civilized man gives the same sensation of texture and color to the savage that it does to its owner, but he is so far from perceiving it in the same way that he packs it away and continues to go naked. The Orientals, who disdain the use of chairs and prefer to sit cross-legged on the floor, can never perceive a chair just as we do who use them daily, and to whom chairs are so saturated with social suggestions and associations.

Also, like the child, we must perceive objects through our motor response to them as well as in

terms of sensations. The boy who has his knowledge of a tennis racket from looking at one in a store window, or indeed from handling one and looking it over in his room, can never know a tennis racket as does the boy who plays with it on the court. Objects get their significance not alone from their qualities, but even more from their use as related to our own activities.

The part played by the motor response.

Again, like the child, we must get our knowledge of an object, if we are to get it well, from the objects themselves at first hand, and not second hand through descriptions of them by others. The fact that there is so much of the material world about us that we can never hope to learn it all, has made it necessary to put down in books many of the things which have been discovered concerning nature. This necessity has, I fear, led many away from nature itself to books—away from the living reality of things to the dead embalming cases of words, in whose empty forms we see so little of the significance which resides in the things themselves. We are in danger of being satisfied with the *forms* of knowledge without its *substance*—with definitions contained in words instead of in qualities and uses.

First-hand contact with objects necessary.

In like manner we come to know distance, form, and size. If we have never become acquainted with a mile by actually walking a mile, running a mile, riding a bicycle a mile, driving a horse a mile, or traveling a mile on a train, we might listen for a long time to some one tell how far a mile is, or state the distance from Chicago to Denver, without knowing much about it in any way except word definitions. In order to understand a mile, we must come to know it in as many ways as possible through sense activities of our

Space relations known through actual experience.

own. Although many children have learned that it is 25,000 miles around the earth, probably no one who has not encircled the globe has any reasonably accurate notion just how far this is. For words cannot take the place of perceptions in giving us knowledge. In the case of shorter distances, the same rule holds. The eye must be assisted by experience of the muscles and tendons and joints in actually covering distance, and learn to associate these sensations with those of the eye before the eye alone can be able to say, "That tree is ten rods distant." Form and size are to be learned in the same way. The hands must actually touch and handle the object, experiencing its hardness or smoothness, the way this curve and that angle feels, the amount of muscular energy it takes to pass the hand over this surface and along that line, the eye taking note all the while, before the eye can tell at a glance that yonder object is a sphere, and that this surface is two feet on the edge.

Through association one phase of an object suggests all the rest.

This association of the senses in working together obviates the necessity of having all the sensations from an object present before we can perceive the object, providing we have once known it through the various senses. We have become so accustomed when we see the object *book* to experience certain other sensations along with that of sight that a mere glance at the book seems to start the train of other habitual accompaniments; and size, weight, contact, the associations of the reading from it, and all the rest that goes to make up *book* fall into line at once, merely on the suggestion received from the visual sensation. While we may not have thought of size, form, weight, etc., it is perfectly evident that former experiences of these kinds now enter into our perception of this

book; else why are we so astonished to find that a certain object which looks like a book turns out to be only a box made to imitate a book, and that it is full of bonbons instead of leaves covered with print? Or, seeing the head of a familiar cow projecting above a fence which hides the rest of the body from view, we unhesitatingly say, "There is my old cow," the remainder of the body being supplied from former acquaintance. That this former experience really does supply what is lacking in the part actually seen can be believed from the surprise one would feel if, instead of the familiar body of the cow, we should find, on going around the fence, that the head was now fastened to the body of a whale.

Sensation and perception furnish the basis for our thought structure.

Thus sensation and perception constantly work together to give us our "world of the senses"; or, rather, they are the two phases of the process by which this mental world is constructed. Sensation gives to the mind its world of *qualities*, which perception uses in constructing the *world of objects*, and these, finally, as existing in certain relations of *space* and *time*. And it is precisely on this basis that the mind must build all that comes after. On this foundation must rest all our systems of thought and philosophy. For while thinking may rise above the things of the senses, yet here are found the images, the "thought stuff," the terms for all thinking. And only as we build a broad and thorough foundation in sensation and perception can we hope to rear a worthy thought structure upon it.

EXERCISES

Seat yourself with eyes closed and try to tell the direction of some sound, like that made by snapping the finger nail against the edge of the thumb nail, the experimenter producing the sound from various directions and at a distance of about eighteen inches from the head.

Look at some complex color, and see if you can determine the different colors which enter into it; e. g., what colors can you detect in purple? in brown?

While listening to an orchestra try to select out one instrument and listen to that alone, or listen to one voice in a chorus.

How many different shades can you detect in the landscape spread before you? How many colors?

Apply a piece of ice to your tongue, to your lips, to your forehead, to the back of your hand, to your arm. Does the temperature seem the same? Explain.

Take a large iron nail, cool it in snow or cold water, then pass the point slowly over the skin on the back of the hand. Do you detect certain points which are distinctly cold? Now heat the nail as warm as is comfortable to the skin, and repeat the experiment. Do you find spots which are distinctly hot?

After you have taken a glance at a stranger try to recall as many items of his dress and appearance as possible.

Have some one place a miscellaneous collection of common objects on a table and cover them with a cloth. Have the cloth lifted for five seconds while you look at the collection. How many objects can you name?

Glance out of a window at a landscape or a street and then see how many of the visible objects you can name.

Have you the habit of perceiving accurately and widely? How can this habit be improved?

SUGGESTED READINGS

Royce, " Outlines of Psychology," Chapters V and IX.
Angell, " Psychology," Chapters V and VI.
Dewey, " Psychology," Chapter III, Sec. 1, and Chapter V.
Thorndike, " Elements of Psychology," Chapter II.
James, " Psychology," Briefer Course, Chapter XX.
Schaeffer, " Thinking and Learning to Think," Chapters II and III.

CHAPTER VII

MENTAL IMAGERY

Present thinking depends on past experience.

As you sit thinking, a company of you together, your thoughts run in many diverse lines. Yet with all this diversity, your minds possess this common characteristic: *Though your thinking all takes place in what we call the present moment, yet in every case it goes on largely in images of past experiences.* Images of things you have seen or heard or felt; of things you have thought out before and which now recur to you; of things you remember, such as names, dates, places, events; of things which you do not remember as a part of your past at all, but which belong to it and come from it nevertheless—these are the things which form a large part of your mental stream, and which give content to your thinking. You may think of a thing which is actually going on now, or of one which is to occur in the future; but, after all, you are dependent on your past experience for the material which you put into your thinking of the present moment for your thought stuff. Indeed, nothing can enter your present thinking which does not link itself to something in your past experience. The savage Indian in the primeval forest never thought about killing a deer with a rifle merely by pulling a trigger, or of turning a battery of machine guns on his enemies to annihilate them—none of these things were

related to his past experience; hence he could not think in such terms.

The present interpreted by the past.

Not only can we not think at all except in terms of our past experience, but even if we could, the present would be meaningless to us; for the present is interpreted in the light of the past. The sedate man of affairs who decries athletic sports, and has never taken part in them, cannot understand the wild enthusiasm which prevails between rival teams in a hotly contested event. The fine work of art is to the one who has never experienced the appeal which comes through beauty, only so much of canvas and variegated patches of color. Paul says that Jesus was "unto the Greeks, foolishness." He was foolishness to them because nothing in their experience with their own gods had been enough like the character of Jesus to enable them to interpret Him.

The future also depends on the past.

To the mind incapable of using past experience, the future also would be impossible; for we can look forward into the future only by placing in it experiences the elements of which we have already known. The savage who has never seen the shining yellow metal does not dream of a heaven whose streets are paved with gold, but rather of a "happy hunting ground." If you will analyze your own dreams of the future you will see in them familiar images, perhaps grouped together in new forms, but coming in their elements from your past experience nevertheless. All that would remain to a mind devoid of a past would be the little bridge of time which we call the "present moment," a series of unconnected *nows*. Thought would be impossible, for the mind would have nothing to compare and relate. Personality would not exist; for personality requires continuity of experience, else

we should be a new person each succeeding moment, without memory and without plans. Such a mind would be no mind at all.

Rank determined by ability to utilize past experience.

So important is past experience in determining our present thinking and guiding our future actions, that the place of an individual in the scale of creation is determined largely by the ability to profit by past experience. The scientist tells us of many species of animals now extinct, which lost their lives and suffered their race to die out because when, long ago, the climate began to change and grow much colder, they were unable to use the experience of suffering in the last cold season as an incentive to provide shelter, or move to a warmer climate against the coming of the next and more rigorous one. Man was able to make the adjustment; and, providing himself with clothing and shelter and food, he survived, while myriads of the lower forms perished. The singed moth again and again dares the flame which tortures it, and at last gives its life a sacrifice to its folly; the burned child fears the fire, and does not the second time tempt the lesson. So also can the efficiency of an individual or a nation, as compared with other individuals or nations, be determined. The inefficient are those who repeat the same error or useless act over and over, or else fail to repeat a chance useful act whose repetition might lead to success. They are unable to learn their lesson and be guided by experience. Their past does not sufficiently minister to their present, and through it direct their future.

Past experience conserved in both mental and physical terms.

If past experience plays so important a part in our welfare, how, then, is it to be conserved so that we may secure its benefits? Here, as elsewhere, we find the mind and body working in perfect unison and har-

mony, each doing its part to further the interests of both. The results of our past experience may be read in both our mental and our physical nature.

Physical retention of past experience.

On the physical side past experience is recorded in modified structure through the law of habit working on the tissues of the body, and particularly on the delicate tissues of the brain and nervous system. This is easily seen in its outward aspects. The stooped shoulders and bent form of the workman tells a tale of physical toil and exposure; the bloodless lips and pale face of the victim of the city sweat shop tell of foul air, long hours, and insufficient food; the rosy cheek and bounding step of childhood, of fresh air, good food, and happy play. The modification of the nervous system by experience is not so easy to see at the first glance; but it is here that the effects are the most marked, for nerve cells are the most unstable and easily modified of all. Some motor activity large or small is performed, in consequence of an activity in the nerves and brain, which leaves the cells and fibers so modified that the act is repeated more easily the second and each succeeding time. Or it may be that the act is one of hearing, or seeing, or tasting; here as in the other case the cortical activity accompanies the act, and the act is more easily performed thereafter. If the external stimulus occurs again as it did to produce the act in the first instance, the same cortical activity will follow, and the original perception will again be repeated. If, however, *the cortical activity is produced indirectly by means of a nerve current coming by the way of some other cortical center*, an *image* is produced; as when the sound of a person's name spoken calls up a visual picture of the person in the mind, or the sight of a certain person calls

Mental retention in images.

up the taste of ice cream which we ate together last week. In the first case the visual area of the cortex, once active at the same time with the auditory area connected with the person's name, is easily excited again by a current coming by way of the auditory center when the name is pronounced; in the second case the visual center was active together with the taste center, and the excitation of the visual center connected with seeing the person easily sets up a corresponding activity in the center connected with taste.

All our past experience is potentially at our command.

Thus we can again experience sights, sounds, tastes, and smells which we have known before, without having the stimuli actually present to the senses. In this way all our past experience is potentially available to the present. All the objects we have seen, it is potentially possible again to see in the mind's eye without being obliged to have the objects before us; all the sounds we have heard, all the tastes and smells and temperatures we have experienced, we may again have presented to our minds in the form of mental images without the various stimuli being present to the end organs of the various senses. In this way the total number of objects in our experience is infinitely multiplied; for many of the things we have seen, or heard, or smelled, or tasted, we cannot again have present to the senses, and without this power we would never get them again. And besides this fact, it would be inconvenient to have to go and secure afresh each sensation or perception every time we need to use it in our thought. While *habit*, then, conserves our past experience on the physical side, the *image* does the same thing on the mental side, and each works to support and strengthen the other.

Images to be viewed by introspection.

The remainder of the description of images will be easier to understand, for each of you can know just what is meant in every case by appealing to your own mind. I beg of you not to think that I am presenting something new and strange, a curiosity connected with our thinking which has been discovered by scholars who have delved more deeply into the matter than we can hope to do. Every day—no, more than that, every hour and every moment—these images are flitting through our minds, forming the large part of our stream of consciousness. Says Royce, " The sensory experience and the imagery of any moment, when taken together with the state of feeling of that moment, constitute the mental material of the moment; and that, too, whether we are thinking of the loftiest or of the most trivial matters." Let us see whether we can turn our attention within and discover some of our images in their flight. Let us introspect.

A simple test.

I know of no better way to proceed than that adopted by Francis Galton years ago, when he asked the English men of letters and science to think of their breakfast tables, and then describe the images which appeared. I am about to ask each one of you to do the same thing, but I want to warn you beforehand that the images will not be so vivid as the sensory experiences themselves. They will be much fainter and more vague, and less clear and definite; they will be fleeting, and must be caught on the wing. *Let each one now recall the dining table as you last left it, and then answer questions concerning it like the following:*

The varied imagery suggested.

Can I see clearly in my " mind's eye " the whole table as it stood spread before me? Can I see all parts of it equally clearly? Do I get the snowy white

and gloss of the linen? The delicate coloring of the china, so that I can see where the pink shades off into the white? The graceful lines and curves of the dishes? The sheen of the silver? The brown of the toast? The yellow of the cream? The rich red and dark green of the bouquet of roses? The sparkle of the glassware? Can I again hear the rattle of the dishes? The clink of the spoon against the cup? The moving up of the chairs? The chatter of the voices, each with its own peculiar pitch and quality? The twitter of a bird outside the window? The tinkle of a distant bell? The chirp of a neighborly cricket? Can I taste clearly the milk? The coffee? The eggs? The bacon? The rolls? The butter? The jelly? The fruit? Can I get the appetizing odor of the coffee? Of the meat? The oranges and bananas? The perfume of the lilac bush outside the door? The perfume from a handkerchief newly treated to a spray of heliotrope? Can I recall the touch of my fingers on the velvety peach? On the smooth skin of an apple? On the fretted glassware? The feel of the fresh linen? The contact of leather-covered or cane-seated chair? Of the freshly donned garment? Can I get clearly the temperature of the hot coffee in the mouth? Of the hot dish on the hand? Of the ice water? Of the grateful coolness of the breeze wafted in through the open window? Can I feel again the strain of muscle and joint in passing the heavy dish? Can I feel the movement of the jaws in chewing the beefsteak? Of the throat and lips in talking? Of the chest and diaphragm in laughing? Of the muscles in sitting and rising? In hand and arm in using knife and fork and spoon? Can I get again the sensation of pain which accompanied biting

Visual.

Auditory.

Gustatory.

Olfactory.

Tactile.

Temperature.

Kinæsthetic.

on a tender tooth? From the shooting of a drop of acid from the rind of the orange into the eye? The chance ache in the head? The pleasant feeling connected with the exhilaration of a beautiful morning? The feeling of perfect health? The pleasure connected with partaking of a favorite food? Pain.

It is more than probable that some of you cannot get perfectly clear images in all these lines, certainly not with equal facility; for the imagery from any one sense varies greatly from person to person. A celebrated painter was able, after placing his subject in a chair and looking at him attentively for a few minutes, to dismiss the subject and paint a perfect likeness of him from the visual image which recurred to the artist every time he turned his eyes to the chair where the sitter had been placed. On the other hand, a young lady, a student in my psychology class, tells me that she is never able to recall the looks of her mother when she is absent, even if the separation has been only for a few moments. She could get an image of the form, with the color and cut of the dress, but never the features. One person may be able to recall a large part of a concert through his auditory imagery, and another almost none. When Mozart was fourteen years old he listened to Allegri's "Miserere," given in St. Peter's at Rome. The Romish Church had so jealously guarded this piece of music that never a line of it had been written out, on pain of excommunication. Young Mozart listened, silently went home and retired, and as silently arose after the family had fallen asleep, and then through the night reproduced, note for note, all of the wonderful and intricate piece of music, and this without an error. Power of imagery varies in different people.

On the other hand, a well-known pastor tells me that he is unable to recall the difference between "Old Hundred" and "Yankee Doodle," and almost unable to distinguish the difference when they are played.

Some types of imagery more marked than others.

Likewise, the imagery from the different senses varies greatly in the same person. This would naturally be the case; for not all types of experience enter equally into our minds, since the consciousness is selective in the objects of its attention. A high degree of attention means, on the physical side, great tension in the nerve cells connected with the object of attention, and this high degree of activity in the cells renders them doubly ready to perform a like activity again. But this is only a physiological statement of the fact that the particular type of imagery connected with this cortical center will be easily produced. Probably all of us have at some time had some experience, some crisis in our life, which stands out vividly above any other experience which we can recall. Even little irrelevant details were so impressed upon us that they stick in our mind now, after the lapse of years, as if they had occurred but yesterday. The experience, whatever it was, which gives us this vivid imagery, occurred under a state of extremely high tension in the nerve centers—or, in other words, of a high degree of attention. Our perceptions were particularly clear and pronounced. Moreover, the experience was of such a type, and so closely related to our life and its interests, that we have often recalled the circumstances since, and lived the occurrences over again, until every phase of it has been dwelt upon a thousand times.

This illustration, then, gives us the clew to the types

of imagery which will prevail in our thinking. Those who most easily attend to the visual in their experience, and who oftenest recall the visual in their thought, will find the visual predominating in their imagery; those who are most prone to dwell upon the auditory and who use it most will find auditory imagery prevailing, while those who are accustomed to many delicate adjustments and live a life of motor activity will find their imagery running to the motor, etc. Now it happens that more of our experience on the sensory side is connected with vision than with any of the other sensations; hence, most people have a predominance of *visual* imagery, although some are clearly of the *audile* or the *motor* type.

Predominating types.

This is no reason, however, why those who may be strong in one type should neglect the other types. Binet well says that the man who has not every type of imagery almost equally well developed is only the fraction of a man. The one who lacks the ability to recall his sensory experiences readily and clearly in the form of visual, auditory, tactual, taste, smell, and all the other kinds of images, in this far lacks the materials for thinking; and the one who lacks the images connected with a large variety of movements lacks the power to put his thoughts into acts. And, indeed, not only shall we be unable to think well ourselves without a good stock of images from all the senses, but we shall even be unable to interpret the thought of others who employ imagery in their speaking or writing. Halleck shows clearly, in his "Education of the Central Nervous System," from which I shall make several quotations, how freely the great writers use all possible types of imagery in their writings.

Value of a wide range of clear imagery.

L OF C

The use of images in the interpretation of literature.

Shakespeare, describing certain beautiful music, appeals to the sense of smell to make himself understood:

> . . . it came o'er my ear like the sweet sound
> That breathes upon a bank of violets,
> Stealing and giving odor!

Lady Macbeth cries:

Here's the smell of the blood still:
All the perfumes of Arabia will not sweeten this little hand.

Milton has Eve say of her dream of the fatal apple:

> . . . The pleasant sav'ry smell
> So quickened appetite, that I, methought,
> Could not but taste.

How utterly impossible for one who has not a delicate sense of smell and a large stock of images from this sense to interpret these lines! They will be to him but a jumble of words, and he is likely to decide that poetry is nothing but foolishness.

Likewise with the sense of touch:

> . . . I take thy hand, this hand
> As soft as dove's down, and as white as it.

Or from *Comus:*

> Thus I set my printless feet
> O'er the cowslip's velvet head,
> That bends not as I tread.

Imagine a person devoid of delicate tactile imagery, with senseless finger tips and leaden footsteps, undertaking to interpret these exquisite lines!

Shakespeare thus appeals to the muscular imagery:

> At last, a little shaking of mine arm
> And thrice his head thus waving up and down,
> He raised a sigh so piteous and profound
> As it did seem to shatter all his bulk
> And end his being.

Many passages like the following appeal to the temperature images:

> Freeze, freeze, thou bitter sky,
> Thou dost not bite so nigh
> As benefits forgot!

To one whose auditory imagery is meager, the following beautiful lines are nothing but a senseless jingle of words:

> How sweet the moonlight sleeps upon this bank!
> Here we will sit and let the sounds of music
> Creep in our ears; soft stillness and the night
> Become the touches of sweet harmony.

> While the plowman near at hand
> Whistles o'er the furrow'd land
> And the milkmaid singeth blithe
> And the mower whets his scythe.

Who that has not stood under the open sky and watched the stars come out, and retained a vivid impression of the experience, can understand when Longfellow says:

> Silently, one by one, in the infinite meadows of heaven,
> Blossomed the lovely stars; the forget-me-nots of the angels!

All literature is so full of visual imagery that one can hardly find a couplet that is not filled with it.

Now Morn her rosy steps in th' eastern clime
Advancing, sow'd the earth with orient pearl.

The cowslips tall her pensioners be;
In their gold coats spots you see—
These be rubies, fairy favours,
In those freckles live their savours.
I must go seek some dewdrops here,
And hang a pearl in every cowslip's ear.

And so one might go on quoting, not only from poetry, but from prose as well, and take in history, geography, science, mathematics, philosophy, and all the rest, and the result would be the same, only differing in degree. In them all, the points grasped by our thought and held by our memory, or used by our imagination, are precisely these images of which we have been speaking.

Motor images.

Nor are images less important on the motor side. Movements do not just happen. No muscle acts except under the compulsion of a motor-nerve current. But the only way to secure these motor-nerve currents is either directly from sensory stimuli or else indirectly from sensory centers by means of images. Were it not for images serving as stimuli for motor acts, these could never be more complex than our immediate sensory experiences or the habits growing out of them. Manifestly this would give us so circumscribed a range of activities that any progress in living would be impossible. The part of sensory experience coming from the immediately present objects could no more serve as the stimulus to efficient acts than it alone can give us efficient thinking. In both cases mental imagery must lend its aid to bring our past experience to the help of the present.

A good stock of images fundamental to all development.

It is evident, then, that the youth who seeks to develop a good mind, capable of well-balanced thought, ready memory, and good imagination, must have first of all a good stock of imagery ready at his command; and if he is to be efficient in his motor acts as well as his mental, he must meet the same requirement. A word on the means of developing our imagery will, consequently, not be out of place.

Development of images.

In the first place, we may put down as an absolute requisite *such an environment of sensory stimuli as will tempt every sense to be awake and at its best,* that we may be led into a large acquaintance with the objects of our material environment. No one's stock of sensory images is greater than the sum total of his sensory experiences. No one ever has images of sights, or sounds, or tastes, or smells which he has never experienced. Likewise, he must have had the fullest and freest possible liberty in motor activities. For not only is the motor act itself made possible through the office of imagery, but the motor act clarifies and makes useful the images themselves. The boy who has actually made a table, or a desk, or a box has ever afterward a different and a better image of one of these objects than before; so also when he has owned and ridden a bicycle, his image of this machine will have a different significance from that of the image founded upon the visual perception alone of the wheel he longingly looked at through the store window or in the other boy's dooryard.

The influence of frequent recall.

But sensory experiences and motor responses alone are not enough, though they are the basis of good imagery. *There must be frequent recall.* The sunset may have been never so brilliant, and the music never so entrancing; but if they are never thought of and

dwelt upon after they were first experienced, little will remain of them after a very short time. It is by repeating them often in experience through imagery that they become fixed, so that they stand ready to do our bidding when we need next to use them.

The reconstruction of our images.

To richness of experience and frequency of the recall of our images we must add one more factor; namely, that of their *reconstruction* or working over. Few if any images are exact recalls of former percepts of objects. Indeed, such would be neither possible nor desirable. The images which we recall are recalled for a purpose, or in view of some future activity, and hence must be *selective,* or made up of the elements of several or many former related images. Thus the boy who wishes to construct a box without a pattern to follow recalls the images of numerous boxes he may have seen, and from them all he has a new image made over from many former percepts and images, and this new image serves him as a working model. In this way he not only gets a copy which he can follow to make his box, but he also secures a new product in the form of an image different from any he ever had before, and is therefore by so much the richer. *It is this working over of our stock of old images into new and richer and more suggestive ones that constitutes the essence of constructive imagination.*

We comprehend best in images with which we are familiar.

The facts we have just been considering are of vital importance in education. No one will ever know how many children, whose minds are of the audile type, have been wrongly accused of dullness because they could not comprehend the description of a scene in nature or a construction in geometry which was given in visual terms. It is impossible for one whose

mind is lacking in auditory imagery to appreciate fully a description necessitating a large proportion of images of this type, or one whose images are deficient on the motor side to enter fully into the account of an athletic event. To be obliged to deal with imagery to which we are not accustomed in our daily thinking is like listening to the speaking of a foreign language when we do not know enough of its words to enable us to interpret its thought.

But the more forms of imagery into which we put our knowledge, the better.

On the other hand, the more types of imagery into which we can put our thought, the more fully is it ours. The spelling lesson needs not only to be taken in through the eye, that we may retain a visual image of the words, but also to be recited orally, so that the ear may furnish an auditory image, and the organs of speech a motor image of the correct forms; and it needs also to be written, and thus given into the keeping of the hand, which finally needs most of all to know it and retain it. The reading lesson should be taken in through both the eye and the ear, and then expressed by means of voice and gesture in as full and complete a way as possible, that it may be associated with motor images. The geography lesson needs not only to be read, but to be drawn, or molded, or constructed. The history lesson should be made to appeal to every possible form of imagery. The arithmetic lesson must be not only computed, but measured, weighed, and pressed into actual service. Thus we might carry the illustration into every line of education and experience, and the same truth holds. *What we desire to comprehend completely and retain well, we must apprehend through all available senses and conserve in every possible type of image and form of expression.*

QUESTIONS AND EXERCISES

Imagine a three-inch cube. Paint it. Then saw it up into inch cubes, leaving them all standing in the original form.

How many inch cubes have paint on three faces? How many on two faces? How many on one face? How many have no paint on them? Answer all these questions by referring to your imagery alone.

Try often to recall images in the various sensory lines; determine in what classes of images you are least proficient and try to improve in these lines.

How is the singing teacher able, after his class has sung through several scores, to tell that they are flatting?

Study your imagery carefully for a few days to see whether you can discover your predominating type of imagery.

Devise a test similar to the first one mentioned above, based on connecting the mid-points of an equilateral triangle. Discover how many figures of different kinds result.

SUGGESTED READINGS

Royce, "Outlines of Psychology," Chapter VI.

Stout, "Groundwork of Psychology," Chapter X.

Halleck, "The Education of the Central Nervous System," Chapter VII.

Schaeffer "Thinking and Learning to Think," Chapter XII.

Sully, "Studies of Childhood," Chapter II.

CHAPTER VIII

MEMORY

What is retained in memory.

Now that you come to think of it, you can recall perfectly well that Columbus discovered America in 1492; that your house is painted white; that it rained a week ago to-day. But where were these once-known facts, now remembered so easily, while they were out of your mind? Where did they stay while you were not thinking of them? The common answer is, "Stored away in my memory." Yet no one believes that the memory is a warehouse of facts which we pack away there when we for a time have no use for them, as we store away our old furniture. The truth is that the simple question I asked you is by no means an easy one, and I will answer it myself by asking you an easier one: As we sit with the sunlight streaming into our room, where is the darkness which filled it last night? And where will all this light be at midnight to-night? Answer these questions, and the ones I asked about your remembered facts will be answered. While it is true that, regardless of the conditions in our little room, darkness still exists wherever there is no light, and light still exists wherever there is no darkness, yet for this particular room *there is no darkness when the sun shines in,* and *there is no light when the room is filled with darkness.* So in the case of remembered fact. Although the fact that Columbus discovered America some four hundred years ago, that your house

is of a white color, that it rained a week ago to-day, exists as a fact regardless of whether your minds think of these things at all, yet the truth remains as before: for the particular mind which remembers these things, *the facts did not exist while they were out of the mind.*

It is not the remembered fact which is retained, BUT THE POWER TO REPRODUCE THE FACT WHEN WE REQUIRE IT.

The physical basis of memory.

The power to reproduce a once-known fact depends ultimately on the brain. This is not hard to understand if we go back a little and consider that brain activity was concerned in every perception we have ever had, and in every fact we have ever known. Indeed, it was through a certain neural activity of the cortex that you were able originally to know that Columbus discovered America, that your house is white, and that it rained on a day in the past. Without this cortical activity, these facts would have existed just as truly, but *you* would never have known them. Without this neural activity in the brain there is no consciousness, and to it we must look for the recurrence in consciousness of remembered facts, as well as for those which appear for the first time.

How we remember.

Now, if we are to have a once-known fact repeated in consciousness, or in other words *remembered,* what we must do on the physiological side is to provide for a repetition of the neural activity which was at first responsible for the fact's appearing in consciousness. The mental accompaniment of the repeated activity *is the memory.* Thus, as *memory is the approximate repetition of once-experienced mental states or facts, together with the recognition of their belonging to our past,* so *it is accomplished by an approximate repeti-*

tion of the once-performed neural process in the cortex which originally accompanied these states or facts.

The repetition of the neural activity in the cortex is made possible through the law of habit working in the nervous system. Here, as elsewhere, habit makes an activity once performed more easy of performance each succeeding time. Through this law a neural activity once performed tends to be repeated; or, in other words, a fact once known in consciousness tends to be remembered. That so large a part of our past is lost in oblivion, and out of the reach of our memory, is probably much more largely due to a failure to *recall* than to *retain*. We say that we have forgotten a fact or a name which we cannot recall, try as hard as we may; yet surely all have had the experience of a long-striven-for fact suddenly appearing in our memory when we had given it up and no longer had use for it. It was retained all the time, else it never could have come back at all.

The repeated neural activity depends on law of habit.

An aged man of my acquaintance lay on his death-bed. In his childhood he had first learned to speak German; but, moving with his family when he was eight or nine years of age to an English-speaking community, he had lost his ability to speak German, and had been unable for a third of a century to carry on a conversation in his mother tongue. Yet during the last days of his sickness he lost almost wholly the power to use the English language, and spoke fluently in German. During all these years his brain paths had retained the power to reproduce the forgotten words, even though for so long a time the words could not be recalled. James quotes a still more striking case of a young woman who was seized with a fever, and during her delirious ravings was heard talking

Retention and recall.

in Latin, Hebrew, and Greek. She herself could neither read nor write, and the priests said she was possessed of a devil. But a physician unraveled the mystery. When the girl was nine years of age, a pastor, who was a noted scholar, had taken her into his home as a servant, and she had remained there until his death. During this time she had daily heard him read aloud from his books in these languages. Her brain had indelibly retained the record made upon it, although for years she could not have recalled a sentence, if, indeed, she had ever been able to do so.

Individual differences in brains.

There is, however, a very great difference between brains as to the actual possibility of recall through them. Some brains are "like wax to receive and like marble to retain"; with them every little fact which enters experience is kept seemingly without effort and recalled at will. These are the brains in which great possibilities reside in the way of an efficient memory, and which, if rightly used in remembering, will prove a priceless boon to their owners. Other brains receive impressions much more slowly, but retain well what has once been fully given into their keeping. Much study and many repetitions may be necessary in order to get the facts well established; but once completely in the mind, they are there to stay. These brains are of the steady, plodding kind, so far as the memory is concerned, but will do their possessors faithful service if they are well trained. Still other brains receive impressions but slowly, and retain them poorly. These brains belong to those who must pore over the lesson for a long time, no matter how faithful the work and efficient the methods of study, and from whom—more discouraging still—facts slip easily away, even after they have once been mastered. Heroic effort will be

required to make up for the handicap which such a brain is to its owner. But whichever type of brain be yours, the fact remains that your brain is the automatic register of all your thoughts and acts, each of which leaves it so modified that the thought or act tends inevitably to be repeated.

The factors involved in memory.

With this explanation of retention we may say, then, that what we can actually remember must (1) be *retained* and (2) be capable of *recall*. We may also add a third factor, *recognition*; we must know the recalled fact as an old friend, as having been known before, as having belonged to our past.

The material of memory images.

But what are the forms in which the memory presents the past to us? What shapes do these forms take as they appear? What is the elemental material with which memory deals? In the light of our discussion upon mental imagery, and with the aid of a little introspection the answer is easy. I ask you to remember your home, and at once a visual image of the familiar house, with its well-known rooms and their characteristic furnishings, comes to your mind. I ask you to remember the last concert you attended, or the chorus of birds you heard recently in the woods; and there comes a flood of images, partly visual, but largely auditory, from the melodies you heard. Or I ask you to remember the feast of which you partook yesterday, and gustatory and olfactory images are prominent among the others which appear. And so I might keep on until I had covered the whole range of your memory; and, whether I ask you for the simple, trivial experiences of your past, for the tragic or crucial experiences, or for the most abstruse and abstract facts which you know and can recall, the case is the same: *whatever memory presents to you comes in the*

form of images of the experiences of your past. These are the only stuff which memory has, the only terms which it can command.

Images always present in memory.

Sometimes we are so intent on the meaning of what we remember that we do not notice the image in which it comes, just as we often fail to notice the form and stationery of a letter which brings us important news. Or it may be that we have never learned to look for our images, and hence their presence escapes us, or rather we fail to recognize them for what they are. But they are always present.

Images vary as to type.

We do not all remember what we call the same fact in like images. When you remembered that Columbus discovered America in 1492, some of you had an image of Columbus the mariner standing on the deck of his ship, as the old picture shows him; and accompanying this image was a feeling of "long agoness." Others, in recalling the same fact, had an image of the coast on which he landed, and perchance felt the rocking of the boat and heard it scraping on the sand as it neared the shore. And still others saw on the printed page the words stating that Columbus discovered America in 1492. And so in an infinite variety of images we may remember what we call the same fact, though of course the fact is not really the same fact to any two of us, nor to any one of us when it comes to us on different occasions in different images. The fact we remember is finally *just what the image presents to us,* together with our interpretation of it, and nothing more nor less. Hence it is very easy to see that our memory is limited by the stock of images which we can command.

Let us see whether we can discover how the recall of these images is possible, and what laws they follow

in their return. Why does the name or the fact which eludes us to-day come unbidden to the mind to-morrow? Why does a fragment of a trivial experience which occurred a decade ago slip into the mind ahead of the thought which we are pursuing? Why, as we dream away an hour, do our memories take some particular direction rather than one of a thousand other directions which they might equally well take? Such experiences as these, which are common to every mind, tend to make us think that memory not only fails to follow any law, but, on occasions at least, directly *violates* all law. A little closer examination will show that such is not the case, but that the run of images through our mental stream follows laws as fixed and inevitable as those which control the earth in its orbit or the tides in their ebb and flow.

Recall obeys law.

Retention, like recall, rests on the laws of habit. To see that this is the case, it will be necessary for us to go back to the fact that recall depends on securing a repetition of the original neural activity in the cortex. Now, if we can find that the exciting of this activity from center to center in the brain as we proceed from fact to fact in the memory follows some law, then we shall have established the law for sequence in the memory. The following laws of brain physiology have been well established:

Laws underlying memory.

1. Brain areas which are *active together at the same time tend to establish associative paths,* so that when one of them is again active the other also is thrown into activity.

2. The *more frequently* a certain cortical activity occurs, the more easily its repetition is brought about.

3. The *more recently* certain brain centers have been

engaged in activity, the more easily they are thrown into activity.

4. The *more intense* the activity, the more easily it is repeated.

The law of association.

The first of these laws is responsible for what the psychologist calls "association of ideas," or, to put it more simply, for the fact that one image in memory calls up another, and this another, and so on, giving us thus an unbroken series of remembered facts, so that our images flow in a continuous stream. It is as if each image, like a man in a relay race, touched hands with the next ahead before dropping out, and from the momentum gained accompanied the substitute a little distance on the way. Each image occupying at a given moment the chief point in our mental stream is selected out of a hundred others which might have been taken, and it will in turn touch hands with another which is to take its place, picking it out of a multitude of available images.

How association comes about.

Let us see from a very simple illustration how this comes about. Suppose you are passing an orchard and see a tree loaded with tempting apples. You hesitate, then climb the fence, pick an apple and eat it, hearing the owner's dog bark as you leave the place. The accompanying diagram will illustrate roughly the centers of the cortex which were involved in the act, and the association fibers which connect them. (See Fig. 16.) Now let us see how you may afterward remember the circumstance through association. Let us suppose that a week later you are seated at your dining table, and that you begin to eat an apple whose flavor reminds you of the one which you plucked from the tree. From this start how may the entire circumstance be recalled? Remembering that the cortical

centers connected with the sight of the apple tree, with our thoughts about it, with our movements in getting the apple, and with hearing the dog bark, were all active together with the taste center, and hence tend to be thrown into activity again from its activity, it is easy to see that we may (1) get a visual image of the apple tree and its fruit from a current over *G-V*; (2) the thoughts, emotions, or deliberations which we

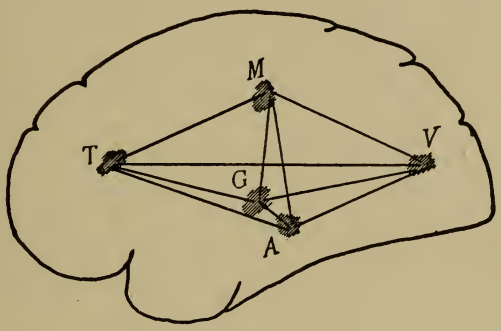

Fig. 18.

had on the former occasion may again recur to us from a current over *G-T*; (3) we may get an image of our movements in climbing the fence and picking the apple from a current over *G-M*; or (4) we may get an auditory image of the barking of the dog from a current over *G-A*. Indeed, we are *sure* to get some one or more of these unless the paths are blocked in some way, or our attention leads off in some other direction. *Which* of these we get first, which of the images the taste image calls to take its place as it drops out of consciousness, will depend, other things being equal, on which center was most keenly active in the original situation. (See the fourth law.) If, at

the time we were eating the stolen fruit, our thoughts were keenly self-accusing for taking the apples without permission, then the current will probably discharge through the path *G-T*, and we shall recall these thoughts and their accompanying feelings. But if it chances that the barking of the dog frightened us badly, then more likely the discharge from the taste center will be along the path *G-A*, and we shall get the auditory image of the dog's barking, which in turn may call up a visual image of his savage appearance over *A-V*. It is clear, however, that, given any one of the elements of the entire situation back, the rest are potentially possible to us, and anyone may serve as a "cue" to call up all the rest. Whether, given the starting point, we get them all, depends solely on whether the paths are sufficiently open between them for the current to discharge between them, granting that the first experience made sufficient impression to be retained.

Association unifies our experiences

Since this simple illustration may be made infinitely complex by means of the millions of fibers which connect every center in the cortex with every other center, and since, in passing from one experience to another in the round of our daily activities, these various areas are all involved in an endless chain of activities so intimately related that each one can finally lead to all the others, we have here the machinery both of retention and of recall—the mechanism by which our past may be made to serve the present through being reproduced in the form of memory images. Through this machinery we are unable to escape our past, whether it be good or bad; for both the good and the bad alike are brought back to us through its operations.

We are simply "pieces of associating machinery."

We are " at the mercy of our associations." We may form certain lines of interest to guide our thought, and attention may in some degree direct it, but one's mental make-up is, after all, largely dependent on the character of his associations. Evil thoughts, evil memories, evil imaginations—these all come about through the association of unworthy or impure images along with the good in our stream of thought. We may try to forget the base deed and banish it forever from our thinking, but lo! in an unguarded moment the nerve current shoots into the old path, and the impure thought flashes into the mind, unsought and unwelcomed. Every young man who thinks he must indulge in a little sowing of wild oats before he settles down to a correct life, and so deals in unworthy thoughts and deeds, is putting a mortgage on his future; for he will find the inexorable machinery of his nervous system grinding the hated images of such things back into his mind as surely as the mill returns to the sack of the miller what he feeds into the hopper. He may refuse to harbor these thoughts, but he can no more hinder their seeking admission to his mind than he can prevent the tramp from knocking at his door. He may drive such images from his mind the moment they are discovered, and indeed is guilty if he does not; but not taking offense at this rebuff, the unwelcome thought again seeks admission.

The law of association inexorable.

The only protection against the return of the undesirable associations is to choose lines of thought as little related to them as possible. But even then, do the best we may, an occasional " connection " will be set up, we know not how, and the unwelcome image stands staring us in the face, as the corpse of Eugene Aram's victim confronted him at every turn though he

The necessity for right thinking.

thought it safely buried. A minister of my acquaintance tells me that in the holiest moments of his most exalted thought, images rise in his mind which he loathes, and from which he recoils in horror. Not only does he drive them away at once, but he seeks to lock and bar the door against them by firmly resolving that he will never think of them again. But alas! that is beyond his control. The tares have been sown among the wheat, and will persist along with it until the end. In his boyhood these images were given into the keeping of his brain cells, and they are only being faithful to their trust.

Nor is the inexorableness of our associations to be deplored, for this has its good side as well as its bad. *Only through association is memory possible at all.* It is not the *fact* of association which is to be dreaded, but its *material.* Thus the practical problem for each of us to consider is the character of the stuff which we shall give over to the keeping of our brains. In other words, we are to keep clear of experiences whose images we shall not be willing to confront in later time and make our companions. Paul was illustrating this truth when he wrote to the men of Philippi, "Finally, brethren, whatsoever things are true, whatsoever things are honest, whatsoever things are just, whatsoever things are pure, whatsoever things are lovely, whatsoever things are of good report; if there be any virtue, and if there be any praise, think on these things." For, after all is said and done, nothing but right thinking will make possible associations in our thinking which will leave no sting or stain.

What constitutes a good memory.

Let us next inquire what are the qualities which enter into what we call a good memory. The merchant or politician will say, "Ability to remember

well people's faces and names''; the teacher of history, "The ability to recall readily dates and events''; the teacher of mathematics, "The power to recall mathematical formulæ''; the hotel waiter, "The ability to keep in mind half a dozen orders at a time''; the manager of a corporation, "The ability to recall all the necessary details connected with the running of the concern.'' While these answers are very divergent, yet they may all be true for the particular person testifying; for out of them all there emerges this common truth, that *the best memory is the one which best serves its possessor.* That is, one's memory not only must be ready and exact, but must produce the right kind of material; it must bring to us what we need in our thinking. A very easy corollary at once grows out of this fact; namely, that in order to have the memory return to us the right kind of matter, we must store it with the right kind of images, for the memory cannot give back to us anything which we have not first given into its keeping.

The good memory does not impartially recall every fact of experience.

The best memory is not necessarily the one which impartially repeats the largest number of facts of our past experience. Everyone has many experiences which he never needs to have reproduced in memory; useful enough they may have been at the time, but wholly useless and irrelevant later. They have served their purpose, and should henceforth slumber in oblivion. They would be but so much rubbish and lumber if they could be recalled. Everyone has surely met that particular type of bore whose memory is so faithful to details that no incident in the story he tells, no matter how trivial, is ever omitted in the recounting. His associations work in such a tireless round of minute succession, without ever being able

to take a jump or a short cut, that he is powerless to separate the wheat from the chaff; so he dumps the whole indiscriminate mass into our long-suffering ears.

Dr. Carpenter tells of a member of Parliament who could repeat long legal documents and acts of Parliament after one reading. When he was congratulated on his remarkable gift, he replied that, instead of being an advantage to him it was often a source of great inconvenience, because when he wished to recollect anything in a document he had read, he could do it only by repeating the whole from the beginning up to the point which he wished to recall. Maudsley says that the kind of memory which enables a person "to read a photographic copy of former impressions with his mind's eye is not, indeed, commonly associated with high intellectual power," and gives as a reason that such a mind is hindered by the very wealth of material furnished by the memory from discerning the relations between separate facts upon which judgment and reasoning depend. It is likewise a common source of surprise among teachers that many of the pupils who could outstrip their classmates in learning and memory do not turn out to be able men. But this, says Whately, "is as reasonable as to wonder that a cistern if filled should not be a perpetual fountain." It is possible for one to be so lost in a tangle of trees that he cannot see the woods.

A good memory is discriminative.

It is not, then, mere re-presentation of facts that constitutes a good memory. The pupil who can reproduce a history lesson by the page has not necessarily so good a memory as the one who remembers fewer facts, but sees the relations between those remembered, and hence is *able to choose what he will remember.* Memory must be *discriminative.* A vast part of what

passes in our thought must be forgotten, needs to be forgotten; its recall but encumbers the mind and hinders thought. The memory must fasten on that which is important for us, and keep that for us. Therefore we can agree that "*the art of remembering is the art of thinking.*" Discrimination must select the important for us out of our mental stream, and these images must be associated with as many others as possible which are already well fixed in memory, and hence are sure of recall when needed. In this way the old will always serve as a cue to call up the new. It is for this reason that it pays in studying history to group the events around some well-known date or event which we are sure to remember. In this way we get them associated with a safe cue.

It is also specialized.

And not only must memory, if it is to be a good memory, omit the generally worthless, or trivial, or irrelevant, and supply the generally useful, significant, and relevant, but it must in some degree be a *specialized memory.* It must minister to the particular needs and requirements of its owner. Small consolation to you if you are a Latin teacher, and are able to call up the binomial theorem or the date of the fall of Constantinople when you are in dire need of a conjugation or a declension which eludes you. It is much better for the merchant and politician to have a good memory for names and faces than to be able to repeat the succession of English monarchs from Alfred the Great to Edward VII, and not to be able to tell John Smith from Tom Brown. It is much more desirable for the lawyer to be able to remember the necessary details of his case than to be able to recall all the various athletic records of the year; and so on. In order to be a good memory for *us*, our

memory must be faithful in dealing with the material which constitutes the needs of our vocations. Our memory may, and should, bring to us many things outside of our immediate vocations, else our lives will be narrow; but its chief concern and most accurate work must be along the path of our everyday requirements at its hands. And this works out well in connection with the physiological laws which were stated a little while since, providing that our vocations are along the line of our interests. For the things with which we work daily, and in which we are interested, will be often thought of together, and hence will become well associated. They will be frequently recalled, and hence more easily remembered; they will be vividly experienced as the inevitable result of interest, and this goes far to insure recall.

Improvement of memory.

It follows from our statement, I think, that improvement in the memory may come both from the side of retention and from that of recall. It may be true, as James says, that our *native* retentiveness is unchangeable. Our nervous systems are given us through heredity, and we are neither to be blamed nor praised for what they are. But we may, nevertheless, use such methods of *recording our facts* as to insure their retention or else their fading out.

Vividness of impression.

If, at the time the fact is recorded, the nerve cells are in a state of high tension—which is but another way of saying, if the mind is in a high degree of concentration and the impression vivid—the retention is relatively secure. It is much more secure than it could be made by many mere repetitions of the fact in a lifeless and inane way. If, further, the fact is recorded when the nervous system is in good "tone," not exhausted from overfatigue and not weakened

from insufficient nourishment, then we have fortified the memory all we can on the retention side. Whatever else is done must be accomplished by making more certain the recall.

Right methods of recording facts.

It is hardly necessary to say that where retention is lacking there can be no recall. On the other hand, there is no doubt that the brain retains many facts which are never recalled, simply because they have formed no associations, and hence have nothing to bring them back. This gives another hint as to our method of recording if we wish to insure recall. The new fact is to be connected with just as many related old facts as possible; and these, themselves sure of recall, will serve as cues for the new when we require it in memory. In this way our knowledge is formed into a logical chain, the new interlinked with the old, so that the recurrence of one part in the mind makes possible the whole. Indeed, this is the only right way to remember facts which have logical relations, and which we wish to make a part of our permanent body of usable knowledge. Any other method makes the recall depend on artificial or arbitrary cues, and the fact remembered never becomes a vital part of our thinking.

The effect of cramming.

It is the truth of this statement which makes "cramming" so poor a method of learning. If this method of study would yield as valuable permanent results, it would be by far the most sensible and economic method to use; for under the stress of necessity we often are able to accomplish results much faster than when no pressure is resting upon us. The difficulty is, however, that the results are not permanent; the facts learned do not have time to seek out and link themselves to well-established associates; learned in an

hour, their retention is as ephemeral as the application which gave them to us. Facts which are needed but temporarily and which cannot become a part of our body of permanent knowledge may profitably be learned by cramming. The lawyer needs many details for the case which he is trying, which not only are valueless to him as soon as the case is decided, but would positively be in his way. He may profitably cram such facts. But those facts which are to become a permanent part of his mental equipment, such as the fundamental principles of law, he cannot cram. These he must have in a logical chain which will not leave their recall dependent upon a chance cue. Crammed facts may serve us during a recitation or an examination, but they never really become a part of us. Nothing can take the place of the logical placing of facts if they are to be remembered with facility, and be usable in thinking when recalled.

Remembering isolated facts.

But after all this is taken into consideration there still remain a large number of facts which refuse to fit into any connection or logical system. Or, if they do belong with some system, their connection is not very close, and we have more need for the few individual facts than for the system as a whole. Hence we must have some means of remembering such facts other than by connecting them with their logical associations. Such facts as may be typified by the multiplication table, certain dates, events, names, numbers, errands, and engagements of various kinds—all these need to be remembered accurately and quickly when the occasion for them arises. We must be able to recall them with facility, so that the occasion for them will not have passed by before we can secure them and we not have failed to do our part because of the

lapse. With facts of this type the means of securing a good memory are the same as in the case of logical memory, except that we must of necessity forego the linking to naturally related associates. We can, however, take advantage of the three laws which have been given: (1) Until the facts are thoroughly learned they must be recalled frequently, so that (2) they shall always be *recent*, and (3) they must be recorded under a *high state of attention.* If these methods are used faithfully, then we have done what we can in the way of insuring the recall of facts of this type, unless we associate them with some artificial cue, such as tying a thread around our finger to remember an errand, or learning the multiplication table by singing it. We are not to be too ready to excuse ourselves, however, if we have forgotten to mail the letter or deliver the message; for our attention may have been very lax when we recorded the direction in the first place, and we may never have taken the trouble to think of the matter between the time it was given into our keeping and the time we were to perform the errand.

Mnemonic devices.

Many ingenious devices have been invented to assist the memory. No doubt each one of you has some way of your own of remembering certain things committed to you, or some much-needed fact which has a tendency to elude you. You may not tie the traditional string around your finger or place your watch in the wrong pocket; but if not, you have invented some method which suits your convenience better. While many books have been written, and many lectures given exploiting mnemonic systems, they are, however, all founded upon the same general principle: namely, that of *association of ideas* in the mind. They all

make use of the same basis for memory that any of us use every time we remember anything, from the commonest event which occurred last hour to the most abstruse bit of philosophy which we may have in our minds. They all tie the fact to be remembered to some other fact which is sure of recall, and then trust the old fact to bring the new along with it when it again comes into the mind.

Artificial devices may be permissible in remembering the class of facts which have no logical associates to which we can relate them; but even then I cannot help feeling that if we should use the same care and ingenuity in carefully recording the seemingly unrelated facts that we do in working out the device and making the association in it, we should discover hidden relations for most of the facts we wish to remember, and we should be able to insure their recall as certainly and in a better way than through the device. Then, also, we should not be in danger of handing over to the device various facts for which we should discover relations, thus placing them in the logical body of our usable knowledge where they belong.

EXERCISES

Have some one pronounce to you the following syllables, varying the order: ski, bij, col, laj, nol, kej, lun, duj, kel, mij. Now try to repeat them in the order in which they were given. Try a similar test by having them written in different order on a slip of paper at which you are to look for five seconds and then write the syllables in order.

Do you find yourself trying to associate the syllables with some cue which will assist in recall?

Try the same experiment with ten words which are not so related to each other as to form a sentence.

Now try the experiment, using this time ten words which together make a sentence. Why do you have no trouble to recall them in order?

When you recall a stanza of poetry, do the various images suggested by the words come to you, or only images of the words themselves?

Try committing some piece of poetry by realizing clearly all its images and associating them in order as you commit. Do you find the recall easier than by committing the words alone?

Are you seeking to improve your memory by associating your facts better through better thinking? by recording these facts under a high state of attention?

Do you ever "cram" for examination? for recitations?

Do you read a large amount of light literature which you do not care to remember? Does it pay?

SUGGESTED READINGS

James, "Psychology," Briefer Course, Chapter XVIII.

James, "Principles of Psychology," Chapter XVI.

Angell, "Psychology," Chapter IX.

Dewey, "Psychology," Chapter VI.

Thorndike, "Elements of Psychology," Chapter III.

Schaeffer, "Thinking and Learning to Think," Chapter XI.

CHAPTER IX

IMAGINATION

Common standards of imagination.

If you are asked whether you have a good imagination, you are likely at once to consider whether you are capable of taking wild flights into impossible realms of thought and evolving unrealities out of airy nothings. Or else you compare yourself with Bulwer, Stevenson, Poe, or De Quincey in their improbable tales and measure your imagination by their standard. Or you may recall the wonderful tales of "The Arabian Nights" or Don Quixote and decide upon the rank of your imagination by your ability to construct such stories.

Other standards.

Now, while the foregoing indicate a high degree of imagination of a particular type, I want to protest against this type's standing as the sole, or even the most important, criterion of a good imagination. A good imagination, like a good memory, is the one which serves its owner best. If De Quincey and Poe and Stevenson and Bulwer found the type which led them into such dizzy flights the best for their particular purpose, well and good; but that is not saying that their type is the best for you, or that you may not rank as high in some other field of imaginative power as they in theirs. While you may lack in their particular type of imagination, they may have been short in the type which will one day make you famous. The artisan, the architect, the merchant, the artist, the

farmer, the teacher, the professional man—all need imagination in their vocations not less than the writers need it in theirs, but each needs a specialized kind adapted to the particular work which he has to do.

The functions of imagination.

Imagination is not a process of thought which must deal chiefly with unrealities and impossibilities, and which has for its chief end our amusement when we have nothing better to do than to follow its wanderings. It is, rather, a commonplace, necessary process which illumines the way for our everyday thinking and acting—a process without which we think and act by haphazard chance or blind imitation. It is the process by which the images from our past experiences are marshaled, and made to serve our present. Imagination looks into the future and constructs our patterns and lays our plans. It sets up our ideals and pictures us in the acts of achieving them. It enables us to live our joys and our sorrows, our victories and our defeats before we reach them. It looks into the past and allows us to live with the kings and seers of old, or it goes back to the beginning and we see things in the process of the making. It comes into our present and plays a part in every act from the simplest to the most complex. It is to the mental stream what the light is to the traveler who carries it as he passes through the darkness, while it casts its beams in all directions around him, lighting up what otherwise would be intolerable gloom.

Imagination in interpreting thought of others.

To illustrate what I mean, let us see some of the most common uses of the imagination. Suppose I describe to you the siege which gave Port Arthur to Japan. Unless you can take the images which my words suggest and build them into struggling, shouting, bleeding soldiers; into forts and entanglements and breast-

works; into roaring cannon and whistling bullet and screaming shell—unless you can take all these separate images and out of them get one great unified complex, then my description will be to you only so many words largely without content, and you will lack the power to comprehend the historical event in any complete way. Unless you can read the poem, and out of the images suggested by the words reconstruct the picture which was in the mind of the author as he wrote "The Village Blacksmith" or "Snowbound," the significance will have dropped out, and the throbbing scenes of life and action become only so many dead words, like the shell of the chrysalis after the butterfly has left its shroud. Without the power of imagination, the history of Washington's winter at Valley Forge becomes a mere formal recital, and you can never get a view of the snow-covered tents, the wind-swept landscape, the tracks in the snow marked by the telltale drops of blood, or the form of the heartbroken commander as he kneels in the silent wood to pray for his army. Without the power to construct this picture as you read, you may commit the words, and be able to recite them and to pass examination upon them, but the living reality of it will forever escape you.

Imagination and science.

Nor is imagination less necessary in other lines of study. Without this power of building living, moving pictures out of images, there is small use to study science beyond what is immediately present to our senses; for some of the most fundamental laws of science rest upon conceptions which can be grasped only as we have the power of imagination. The student who cannot get a picture of the molecules of matter, infinitely close to each other and yet never touching,

all in vibratory motion, yet each within its own orbit, each a complete unit in itself, yet capable of still further division into smaller particles—the student who cannot see all this in a clear visual image can never at best have more than a most hazy notion of the molecular theory of matter. And this means, finally, that the explanations of light and heat and sound, and much besides, will be to him largely a jumble of words which linger in his memory, perchance, but which never vitally become a possession of his mind.

The world of the microscope.

So with the world of the telescope. You may have at your disposal all the magnificent lenses and the accurate machinery owned by modern observatories; but if you have not within yourself the power to build what these reveal to you, and what the books tell you, into the solar system and still larger systems, you can never study astronomy except in a blind and piecemeal sort of way, and all the planets and satellites and suns will never for you form themselves into a system, no matter what the books may say about it.

The world of the telescope.

Your power of imagination determines your ability to interpret literature of all kinds; for the interpretation of literature is nothing, after all, but the reconstruction on our part of the pictures which were in the mind of the writer as he penned the words, and the experiencing of the emotions which moved him as he wrote. Small use indeed to read the history of the centuries unless we can see in it living, acting people, and real events occurring in actual environments. Small use to read the world's great books unless their characters are to us real men and women—our brothers and sisters, interpreted to us by the master minds of the ages. Anything less than this, and we are no longer dealing with literature, but with words—

Imagination in literature and art.

like musical sounds which deal with no theme, or like picture frames in which no picture has been set. Nor is the case different in listening to a speaker. His words are to you only so many sensations of sounds of such and such pitches and intensities and quality, unless your mind keeps pace with his and continually builds the pictures which fill his thought as he speaks. Lacking imagination, the sculptures of Michael Angelo and the pictures of Raphael are to you so many pieces of curiously shaped marble and ingeniously colored canvas. What the sculptor and the painter have placed before you must suggest to you images and thoughts from your own experience, to fill out and make alive the marble and the canvas, else to you they are dead.

Imagination and thinking.

So far I have spoken of imagination only with relation to its use in interpreting the thought of others through the images suggested to us by their language or their handiwork. Let us also see the part it plays in our own thinking. Suppose that, instead of reading a poem, we are writing one; instead of listening to a description of a battle, we are describing it; instead of looking at the picture, we are painting it. Then our object is to make others who may read our language, or listen to our words, or view our handiwork, construct the mental images of the situation which furnished the material for our thought. Our words and other modes of expression are but the description of the flow of images in our minds, and our problem is to make a similar stream flow through the mind of the listener; but strange indeed would it be to make others see a situation which we ourselves cannot see; strange if we could draw a picture without being able to follow its outlines as we draw. Or, suppose we are

teaching science, and our object is to explain the composition of matter to some one, and make him understand how light, heat, etc., depend on the molecular theory; strange if the listener should get a picture if we ourselves are unable to get it. Or, once more, suppose we are to describe some incident, and our aim is to make its every detail stand out so clearly that no one can miss a single one. Is it not evident that we can never make any of these images more clear to those who listen to us or read our words than they are to ourselves?

Some practical phases of imagination.

But we may consider a still more practical phase of imagination, or at least one which has more to do with the humdrum daily life of most of us. Suppose you go to your milliner and tell her how you want your spring hat shaped and trimmed. And suppose you have never been able to see this hat *in toto* in your mind, so as to get an idea of how it will look when completed, but have only a general notion, because you like red velvet, white plumes, and a turned-up rim, that this combination will look well together. Suppose you have never been able to see how you would look in this particular hat with your hair done in this or that way. If you are in this helpless state shall you not have to depend finally on the taste of the milliner, or accept the "model," and so fail to reveal any taste or individuality on your own part? How many times have you been disappointed in some article of dress, because when you planned it you were unable to see it all at once so as to get the full effect; or else you could not see yourself in it, and so be able to judge whether it suited you! How many homes have in them draperies and rugs and wall paper and furniture which are in constant quarrel because

some one could not see before they were assembled that they were never intended to keep company! How many people who plan their own houses, would build them just the same again after seeing them completed! The man who can see a building complete before a brick has been laid or a timber put in place, who can see it not only in its details one by one as he runs them over in his mind, but can see the building in its entirety, is the only one who is safe to plan the structure. And this is the man who is drawing a large salary as an architect, for imaginations of this kind are in demand. Only the one who can see in his "mind's eye," before it is begun, the thing he would create, is capable to plan its construction. And who will say that ability to work with images of these kinds is not of just as high a type as that which results in the construction of plots upon which stories are built!

Imagination and conduct.

Another great field for the imagination is with reference to conduct and our relations with others. Over and over again the thoughtless person has to say, "I am sorry; I did not think." The "did not think" simply means that he failed to realize through his imagination what would be the consequences of his rash or unkind words. He would not be unkind, but he did not imagine how the other would feel; he did not put himself in the other's place. Likewise with reference to the effects of our conduct on ourselves. What youth, taking his first drink of liquor, would continue if he could see a clear picture of himself in the gutter with bloated face and bloodshot eyes a decade hence? Or what boy, slyly smoking one of his early cigarettes, would proceed if he could see his haggard face and nerveless hand a few years

farther along? What spendthrift would throw away his money on vanities could he vividly see himself in penury and want in old age? What prodigal anywhere who, if he could take a good look at himself sin-stained and broken as he returns to his "father's house" after the years of debauchery in the "far country," would not hesitate long before he entered upon his downward career?

The building of ideals and plans.

Nor is the part of the imagination less marked in the formation of our life's ideals and plans. Everyone who is not living blindly and aimlessly must have some ideal, some pattern, by which to square his life and guide his actions. At some time in our life I am sure that each of us has selected the person who filled most nearly our notion of what we should like to become, and measured ourselves by this pattern. But there comes a time when we must idealize even the most perfect individual; when we invest the character with attributes which we have selected from some other person, and thus worship at a shrine which is partly real and partly ideal. As time goes on, we drop out more and more of the strictly individual element, adding correspondingly more of the ideal, until our pattern is largely a construction of our own imagination, having in it the best we have been able to glean from the many characters we have known. How large a part these ever-changing ideals play in our lives we shall never know, but certainly the part is not an insignificant one. And happy the youth who is able to look into the future and see himself approximating some worthy ideal. He has caught a vision which will never allow him to lag or falter in the pursuit of the flying goal which points the direction of his efforts.

Images the material of imagination.

As in the case of memory, again, the material or stuff out of which imagination has to build its structure consists of images. Nothing can ever enter the imagination any more than it can the memory, the elements of which have not first come into our experience, and then been conserved for future use in the form of images. The Indians never dreamed of a heaven whose streets are paved with gold, and in whose center stands a great white throne. Their experience had given them no knowledge of these things; and so, perforce, they must build their heaven out of the images which they had at command, namely, those connected with the chase and the forest. So their heaven was the "happy hunting ground," inhabited by game and enemies over whom the blessed forever triumphed. Likewise the valiant soldiers whose deadly arrows and keen-edged swords and battle-axes won on the bloody field of Hastings, did not picture a far-off day when the opposing lines should kill each other with mighty engines hurling death from behind parapets a dozen miles away. Firearms and the explosive powder were yet unknown, hence there were no images out of which to build such a picture.

The constructive power of imagination.

I do not mean that your imagination cannot construct an object which has never before been in your experience as a whole, for the work of the imagination is to do precisely this thing. It takes the various images at its disposal and builds them into *wholes* which may never have existed before, and which may exist now only as a creation of the mind. And yet we have put into this new product not a single *element* which was not familiar to us in the form of an image of one kind or another. It is the *form* which is new; the *material* is old. This is exemplified every time an in-

ventor takes the two fundamental parts of a machine, the *lever* and the *inclined plane*, and puts them together in relations new to each other and so evolves a machine whose complexity fairly bewilders us. And with other lines of thinking, as in mechanics, inventive power consists in being able to see the old in new relations, and so constantly build new constructions out of old material. It is this power which gives us the daring and original thinker, the Newton whose falling apple suggested to him the planets falling toward the sun in their orbits; the Darwin who out of the thigh bone of an animal was able to construct in his imagination the whole animal and the environment in which it must have lived, and so add another page to the earth's history.

The two factors in imagination.

From the simple facts which we have just been considering, the conclusion is plain that our power of imagination depends on two factors; namely, (1) *the materials available in the form of usable images capable of recall*, and (2) *our constructive ability*, or the power to group these images into new wholes, *the process being guided by some purpose or end.* Without this last provision, the products of our imagination are daydreams with their "castles in Spain," which may be pleasing and proper enough on occasions, but which as an habitual mode of thought are extremely dangerous.

Imagination limited by stock of images.

That the mind is limited in its imagination by its stock of images may be seen from a simple illustration: Suppose that you own a building made of brick, but that you find the old one no longer adequate for your needs, and so purpose to build a new one; and suppose, further, that you have no material for your new building except that contained in the old structure.

It is evident that you will be limited in constructing your new building by the material which was in the old. You may be able to build the new structure in any one of a multitude of different forms or styles of architecture, so far as the material at hand will lend itself to that style of building, and providing, further, that you are able to make the plans. But you will always be limited finally by the character and amount of material obtainable from the old structure. So with the mind. The old building is your past experience, and the separate bricks are the images out of which you must build your new structure through the imagination. Here, as before, nothing can enter which was not already on hand. Nothing goes into the new structure so far as its constructive material is concerned except images, and there is nowhere to get images but from the results of our past experience.

Limited also by our constructive ability.

But not only is our imaginative output limited by the *amount* of material in the way of images which we have at our command, but also and perhaps not less by our *constructive ability*. Many persons might own the old pile of bricks fully adequate for the new structure, and then fail to get the new because they were unable to construct it. So, many who have had a rich and varied experience in many lines are yet unable to muster their images of these experiences in such a way that new products are obtainable from them. These have the heavy, draft-horse kind of intellect which goes plodding on, very possibly doing good service in its own circumscribed range, but destined after all to service in the narrow field with its low, drooping horizon. They are never able to take a dash at a two-minute clip among equally swift competitors, or even swing at a good round pace along the pleasant

highways of an experience lying beyond the confines of the narrow *here* and *now*. These are the minds which cannot discover relations; which cannot *think*. Minds of this type can never be architects of their own fate, or even builders, but must content themselves to be hod carriers.

The need of a purpose.

Nor are we to forget that we cannot intelligently erect our building until we know the *purpose* for which it is to be used. No matter how much building material we may have on hand, nor how skillful an architect we may be, unless our plans are guided by some definite aim, we shall be likely to end with a structure that is fanciful and useless. Likewise with our thought structure. Unless our imagination is guided by some aim or purpose, we are in danger of drifting into mere daydreams which not only are useless in furnishing ideals for the guidance of our lives, but often become positively harmful when grown into a habit. The habit of daydreaming is hard to break, and, continuing, holds our thought in thrall and makes it unwilling to deal with the plain, homely things of everyday life. Who has not had the experience of an hour or a day spent in a fairy-land of dreams, and awakened at the end to find himself rather dissatisfied with the prosaic round of duties which confronted him! I do not mean to say that we should *never* dream; but I know of no more pernicious mental habit than that of daydreaming carried to excess, for it ends in our following every will-o'-the-wisp of fancy, and places us at the mercy of every chance suggestion.

The cultivation of imagination.

Theoretically, then, it is not hard to see what we must do to cultivate our imagination. In the first place, we must take care to secure a large and usable

stock of images from all fields of perception. It is not enough to have visual images alone or chiefly, for many a time shall we need to build structures involving all the other senses and the motor activities as well. This means that we must have a first-hand contact with just as large an environment as possible—large in the world of Nature with all her varied forms suited to appeal to every avenue of sense; large in our contact with people in all phases of experience, laughing with those who laugh and weeping with those who weep; large in contact with books, the interpreters of the men and events of the past. We must not only let all these kinds of environment drift in upon us as they may chance to do, but we must deliberately *seek* to increase our stock of experience; for, after all, experience lies at the bottom of imagination as of every other mental process. And not only must we thus put ourselves in the way of acquiring new experience, but we must by recall and reconstruction, as we saw in an earlier discussion, keep our imagery fresh and usable. For whatever serves to improve our images, at the same time is bettering the very foundation of imagination.

We must not fail to build.

In the second place, we must not fail *to build.* For it is futile to gather a large supply of images if we let the material lie unused. How many people there are who put in all their time gathering material for their structure, and never take time to do the building! They look and listen and read, and are so fully occupied in absorbing the immediately present that they have no time to see the wider significance of the things with which they deal. They are like the students who are too busy studying to have time to think. They are so taken up with receiving that they

never perform the higher act of combining. They are the plodding fact gatherers, many of them doing good service, collecting material which the seer and the philosopher, with their constructive power, build together into the greater wholes which make our systems of thought. They are the ones who fondly think that, by reading bookfuls of wild tales and impossible plots, they are training their imagination. For them, sober history, no matter how heroic or tragic in its quiet movements, is too tame. They have not the patience to read solid and thoughtful literature, and works of science and philosophy are a bore. These are the persons who put in all their time in looking at and admiring other people's houses, and never get time to do any building for themselves.

We should carry our ideals into action.

The best training for the imagination which I know anything about is that to be obtained by taking our own material and from it building our own structure. It is true that it will help to look through other people's houses enough to discover their style of building: we should read. But just as it is not necessary for us to put in all the time we devote to looking at houses in inspecting doll houses and Chinese pagodas, so it is not best for us to get all our notions of imaginative structures from the marvelous and unreal: we get good training for the imagination from reading "Hiawatha," but so can we from reading the history of the primitive Indian tribes. The pictures in "Snowbound" are full of suggestion for the imagination; but so is the history of the Puritans in New England. But even with the best of models before us, it is not enough to follow others' building. We must construct stories for ourselves, must work out plots for our own stories; we must have time to meditate and plan and

build, not idly in the daydream, but purposefully, and then make our images real by *carrying them out in activity,* if they are of such a character that this is possible; we must build our ideals and work to them in the common course of our everyday life; we must think for ourselves instead of forever following the thinking of others; we must *initiate* as well as imitate.

EXERCISES

1. Do you ever skip the descriptive parts of a book and read the narrative?
2. As you read the description of a bit of natural scenery, does it rise before you? As you study the description of a battle, can you see the movements of the troops?
3. Have you ever planned a house as you think you would like it? Can you see it from all sides? Can you see all the rooms in their various finishing and furnishings?
4. What plans and ideals have you formed, and what ones are you at present following?
5. Can you describe the process by which your plans or ideals change?
6. Do you ever try to put yourself in the other person's place?
7. Take some fanciful unreality which your imagination has constructed and see whether you can select from it familiar elements from actual experiences.
8. What use do you make of imagination in the common round of duties in your daily life?
9. What are you doing to improve your imagination?

SUGGESTED READINGS

Royce, "Outlines of Psychology," Chapter VI.
Angell, "Psychology," Chapter VIII.
James, "Psychology," Briefer Course, Chapter XIX.
James, "Principles of Psychology," Chapter XVIII.
Dewey, "Psychology," Chapter VII.

CHAPTER X

THINKING

Interdependence of objects, both physical and mental.

IMAGINE a world in which nothing is related to anything else; in which every object perceived, remembered, or imagined, stands absolutely by itself, independent and self-sufficient! What a chaos it would be! Trees would grow irrespective of soil, animals would live without reference to food and water, no man would have need of any other man. All would be independent of a creator, and no cause would be followed by an effect, nor any effect require a cause. Of course such a world is utterly impossible and unthinkable. Yet this is just such a world as our world of knowledge would be without the power of thought. We might perceive, remember, and imagine all the various objects we please, but without the power to think them together, they would all be totally unrelated, and hence have no meaning.

Meaning depends on relations.

To have a rational meaning for us, things must always be defined in terms of other things, or in terms of their uses. *Fuel* is that which feeds *fire*. *Food* is what is eaten for *nourishment*. A *locomotive* is a machine for *drawing a train*. *Books* are to *read*, *pianos* to *play*, *balls* to *throw*, *schools* to *instruct*, *friends* to *enjoy*, and so on through the whole list of objects which we know or can define. Everything depends for its meaning on its relation to other things; and the more of these relations we can discover, the more fully

do we see the meaning. Thus balls may have other uses than to throw, schools other functions than to instruct, and friends mean much more to us than mere enjoyment. And just in the degree in which we have realized these different relations, have we defined the object, or, in other words, have we seen its meaning.

The function of thinking is to discover relations.

Now it is by *thinking* that these relations are discovered. This is the function of thinking. Thinking takes the various separate items of our experience and discovers to us the relations existing among them, and builds them together into a unified, related, and usable body of knowledge, threading each little bit on the string of relationship which runs through the whole. It was, no doubt, this thought which Tennyson had in mind when he wrote:

> Flower in the crannied wall,
> I pluck you out of the crannies,
> I hold you here, root and all, in my hand,
> Little flower—but *if* I could understand
> What you are, root and all, and all in all,
> I should know what God and man is.

Starting in with even so simple a thing as a little flower, if he could discover all the relations which every part bears to every other part and to all other things besides, he would finally reach the meaning of God and man. For each separate thing, be it large or small, forms a link in an unbroken chain of relationships which binds the universe into an ordered whole.

Near and remote relations.

The relations discovered through our thinking may be very close and simple ones, as when a child sees the relation between his bottle and his dinner; or they may be very remote ones, as when Newton saw the

relation between the falling of an apple and the motion of the planets in their orbits. But whether simple or remote, the seeing of the relationships is in both cases alike thinking; for thinking is nothing, in its last analysis, but the discovering of the relationships which exist between the various objects in our mental stream. Thinking passes through all grades of complexity, from the first faint dawnings in the mind of the babe when it sees the relation between the mother and its feeding, on to the mighty grasp of the sage who is able to "think God's thoughts after Him." But it all comes to the same end finally—the bringing to light of new meanings through the discovery of new relations. And whatever does this is thinking.

The thinking of the child and of the adult.

What constitutes the difference in the thinking of the child and that of the sage? Let us see whether we can discover this difference. In the first place the relations seen by the child are *immediate* relations: they exist between simple percepts or images; the remote and the general are beyond his reach. He has not had sufficient experience to enable him to discover remote relations. He cannot think things which are absent from him, or which he has never known. The child could by no possibility have seen in the falling apple what Newton saw; for the child knew nothing of the planets in their orbits, and hence could not see relations in which these formed one of the terms. The sage, on the other hand, is not limited to his immediate percepts or their images. He can see remote relations. He can go beyond individuals, and think in classes. The falling apple is not a mere falling apple to him, but one of a *class of falling bodies.* Besides a rich experience full of valuable facts, the

trained thinker has acquired also the habit of looking out for relations; he has learned that this is the method *par excellence* of increasing his store of knowledge and of rendering effective the knowledge he has. He has learned how to think. The chief business of the child is the collection of the materials of thought, seeing only the more necessary and obvious relations as he proceeds; his chief business when older grown is to seek out the network of relations which unites this mass of material, and through this process to systematize and give new meanings to the whole.

Complex and distant relations must be discovered.

Relations seen between sensations would mean something, but not much; relations seen between objects immediately present to the senses would mean much more; but our thinking must go far beyond the present, and likewise far beyond individual objects. It must be able to annihilate both time and space, and to deal with millions of individuals together in one class. Only in this way can our thinking go beyond that of the lower animals; for a wise rat, even, may come to see the relation between a trap and danger, or a horse the relation between pulling with his teeth at the piece of string on the gate latch, and securing his liberty. But it takes the farther-reaching mind of man to *invent* the trap and the latch. Perception alone does not go far enough. It is limited to immediately present individuals. The perceptual image is likewise subject to similar limitations. While it enables us to dispense with the immediate presence of the object, yet it deals with separate individuals; and the world is too full of individual objects for us to deal with them separately.

Fortunately for our thinking, the great external world, with its millions upon millions of individual

objects, is so ordered that these objects can be grouped into comparatively few great classes; and for many purposes we can deal with the class as a whole instead of with the separate individuals of the class. Thus there are an infinite number of individual objects in the world which are composed of *matter*. Yet all these myriads of individuals may be classed under the two great heads of *inanimate* and *animate*. Taking one of these again: all animate forms may be classed as either *plants* or *animals*. And these classes may again be subdivided indefinitely. Animals include mammals, birds, reptiles, insects, mollusks, and many other classes besides, each class of which may be still further separated into its *orders, families, genera, species,* and *individuals*. This arrangement economizes our thinking by allowing us to think in large terms.

Relations existing in the external world of objects.

But this somewhat complicated form of classification did not come to man ready-made. Some one had to see the relationship existing among the myriads of animals of a certain class, and group these together under the general term *mammals*. Likewise with birds, reptiles, insects, and all the rest. In order to accomplish this, many individuals of each class had to be observed, the qualities common to all members of the class discriminated from those not common, and the common qualities retained as the measure by which to test the admission of other individuals into this class. The process of classification is made possible by what the psychologist calls the *concept*. The concept enables us to think *birds* as well as bluebirds, robins, and wrens; it enables us to think *men* as well as Tom, Dick, and Harry. In other words, *the concept lies at the bottom of all thinking which rises above the*

How classification is accomplished: The concept.

seeing of the simplest relations between immediately present objects.

Nature and growth of a concept.

We can perhaps best understand the nature of the concept if we watch its growth in the thinking of a child. Let us see how the child forms the concept *dog*, under which he is able finally to class the several hundred or the several thousand different dogs with which his thinking requires him to deal. The child's first acquaintance with a dog is, let us suppose, with a pet poodle, white in color, and named *Gyp*. At this stage in the child's experience, *dog* and *Gyp* are entirely synonymous, including Gyp's color, size, and all other qualities which the child has discovered. But now let him see another pet poodle which is like Gyp except that it is black in color. Here comes the first cleavage between *Gyp* and *dog* as synonyms: *dog* no longer means white, but may mean *black*. Next let the child see a brown spaniel. Not only will white and black now no longer answer to *dog*, but the roly-poly poodle form also has been lost; for the spaniel is more slender. Let the child go on from this until he has seen many different dogs of all varieties: poodles, bulldogs, setters, shepherds, cockers, and a host of others. What has happened to his *dog*, which at the beginning meant the one particular little individual with which he played? *Dog* is no longer white or black or brown or gray: *color* is not an essential quality, so it has dropped out; *size* is no longer essential except within very broad limits; *shagginess* or *smoothness* of coat is a very inconstant quality, so this is dropped; *form* varies so much from the fat pug to the slender hound that it is discarded, except within broad limits; *good nature, playfulness, friendliness*, and a dozen other qualities are likewise found

not to belong in common to *all* dogs, and so have had to go; and all that is left to his *dog* is *four-footedness*, a certain general *form*, and a few other dog qualities of habit of life and disposition. As the term *dog* has been gaining in *extent*, that is, as more individuals have been observed and classed under it, it has correspondingly been losing in *content*, or it has been losing in the specified qualities which belong to it. Yet it must not be thought that the process is altogether one of elimination; for new qualities which are present in all the individuals of a class, but at first overlooked, are continually being discovered as experience grows, and built into the developing concept. What the concept consists of finally *is the common qualities or attributes of the class, which have been abstracted from the different individuals of the class and built together into a new image whose function is to enable us to classify our experience, and thus to deal with classes or universals in our thinking.* Language comes in and crystallizes our concepts in words, so that we are able to understand each others' thoughts in oral or written speech. Words must change in meaning as concepts change, hence the language of a thinking people is constantly growing.

Good thinking cannot be based on poor concepts.

It is not hard to see that the validity of our thinking is conditioned in large part by the correctness of our concepts. It is evident that, if the child has reached but the " poodle " stage in his concept *dog* when he hears the story of a rescue by a St. Bernard of travelers lost on the mountains, he will have trouble to understand how a dog with " poodle " qualities could do the things which the story relates. If our concept of pleasure is limited to the feeling accompanying the satisfying of sensual appetites, we shall

have trouble to comprehend pleasure as related to intellectual achievement, spiritual communion, or æsthetic appreciation. These illustrations also imply that if we are to have good concepts, we must have a broad experience. The child must observe many different kinds of dogs, and we must experience many different kinds of pleasure, if the respective concepts are to be safe ones in our thinking. And not only this, but our observation must be *discriminative.* We must select out of the different individuals their important or characteristic elements, else our concept will lack some of the essential qualities it should possess and will include others which are unnecessary or accidental.

Judgment.

But in the building up of any percepts and concepts, as well as in making use of them after they are formed, another process of thinking enters; namely, the process of *judging.* Judging enters more or less into all our thinking, from the simplest to the most complex. The babe lies staring at his bottle, and finally it dawns on his sluggish mind that this is the object from which he gets his dinner. He has performed a judgment. That is, he has alternately directed his attention to the object before him and to his image of former nursing, discovered the relation existing between the two, and affirmed to himself, "This is what gives me my dinner." "Bottle and what-gives-me-my-dinner" are essentially identical to the child. *Judgment is, then, the affirmation or denial of the essential identity of meaning of two objects of thought.* Even if the proposition in which we state our judgment has in it a negative, the definition will still hold, for the mental process is the same in either case. It is as much a judgment if we say,

"The day is not cold," as if we say, "The day is cold."

The process of judging enters into our percepts.

How judgment enters into the forming of our percepts may be seen from the illustration just given. The act by which the child perceived his bottle had in it a large element of judging. In order that he might perceive the bottle at all, that is, recognize it as a bottle, there had to come to his mind images of former experiences with the thing which looked as this thing looks, and he had to affirm, "Sure enough, this is my old bottle." He had to compare two objects of thought—the one from past experience in the form of images, and the other from the present object, in the form of sensations from the bottle—and then affirm their essential identity. Of course it is not meant that what I have described *consciously* takes place in the mind of the child; but some such process lies at the bottom of every perception, whether of the child or of anyone else.

And also into our concepts.

Likewise it may be seen that the forming of concepts depends on judgment. Every time that we meet a new individual which has to be assigned its place in our classification, judgment is required. Suppose the child, with his immature concept *dog*, sees for the first time a greyhound. He must compare this new specimen with his concept *dog*, and decide that this is or is not a dog. If he discovers the identity of meaning in the essentials of the two objects of thought, his judgment will be affirmative, and his concept will be modified in whatever extent *greyhound* will affect it.

But judgment goes much further than to assist in building percepts and concepts. It takes our concepts after they are formed and discovers and affirms

Judgment leads from particular to general truths.

relations between them, thus enabling us finally to relate classes as well as individuals. It carries our thinking over into the realm of the universal, where we are not hampered by particulars. Let us see how this is done. Suppose we have the concept *man* and the concept *animal*, and that we think of these two concepts in their relation to each other. The mind analyzes each into its elements, compares them, and finds the essential identity of meaning in a sufficient number to warrant the judgment, Man is an animal. This judgment has given a new bit of knowledge, in that it has discovered to us a new relation between two great classes, and hence given both, in so far, a new meaning and a wider definition. And as this new relation does not pertain to any particular man or any particular animal, but includes all individuals in each class, it has carried us over into universals, so that we have a *general* truth and will not have to test each individual man henceforth to see whether he fits into this relation.

What determines the validity of a judgment.

Now since every judgment is made up of an affirmation of relation existing between two terms, it is evident that the validity of the judgment will depend on the thoroughness of our knowledge of the terms compared. If we know but few of the attributes of either term of the judgment, the judgment is clearly unsafe. Imperfect concepts lie at the basis of many of our wrong judgments. A young man complained because his friend had been expelled from college for alleged misbehavior. He said, "Mr. A—— was the best boy in the institution." It is very evident that some one had made a mistake in judgment. Surely no college would want to expel the best boy in the institution. Either my complainant or the authorities of

the college had failed to understand one of the terms in the judgment. Either "Mr. A——" or "the best boy in the institution" had been wrongly interpreted by some one. Likewise, one person will say, "Jones is a good man," while another will say, "Jones is a rascal." Such a discrepancy in judgment must come from a lack of acquaintance with Jones or a lack of knowledge of what constitutes a good man or a rascal.

The remedy for faulty judgments.

No doubt most of us are prone to make judgments with too little knowledge of the terms we are comparing, and it is usually those who have the least reason for confidence in their judgments who are the most certain that they cannot be mistaken. The remedy for faulty judgments is, of course, in making ourselves more certain of the terms involved, and this in turn sends us back for a review of our concepts and percepts upon which the terms depend. It is evident that no two persons can have just the same concepts, for all have not had the same experience out of which their concepts came. The concepts may be named the same, and may be nearly enough alike so that we can usually understand each other; but, after all, I have mine and you have yours, and if we could each see the other's in its true light, no doubt we should save many misunderstandings and quarrels.

The necessity for growing concepts.

Since thinking rests so fundamentally on concepts, progress in our mental life must depend on a constant growth in the number and character of our concepts. Not only must we keep on adding new concepts, but the old must not remain static. When our concepts stop growing, our minds have ceased to grow—we no longer learn. This arrest of development is often seen in persons who have settled into a life of narrow routine, where the demands are few and of a simple

nature. Unless they rise above their routine, they early become "old fogies." Their concepts petrify from lack of use and the constant reconstruction which growth necessitates. On the other hand, the person who has upon him the constant demand to meet new situations or do better in old ones will keep on enriching his old concepts and forming new ones, or else, unable to do this, he will fail in his position. And the person who keeps on steadily enriching his concepts has discovered the secret of perpetual youth so far as his mental life is concerned. For him there is no old age; his thought will be always fresh, his experience always accumulating, and his knowledge growing more valuable and usable.

Reasoning: Discovers relations between judgments.

All the mental processes which we have so far described find their culmination and highest utility in *reasoning*. Not that reasoning comes last in the list of mental activities, and cannot take place until all the others have been completed, for reasoning is in some degree present almost from the dawn of consciousness. The difference between the reasoning of the child and that of the adult is largely one of degree, of reach. Reasoning goes farther than any of the other processes of cognition, for it takes the relations expressed in judgments and out of these relations evolves still other and more ultimate relations. It is hard to define reasoning so as to describe the precise process which occurs; for it is so intermingled with perception, conception, and judgment, that one can hardly separate them even for purposes of analysis, much less to separate them functionally. We may, however, define reasoning provisionally as *thinking with a purpose of arriving at some definite end.* What does this mean? Professor Angell has stated the matter so clearly that

I will quote his illustration of the case: "Suppose that we are about to make a long journey which necessitates the choice from among a number of possible routes. This is a case of the genuinely problematic kind. It requires reflection, a weighing of the *pros* and *cons*, and a giving of the final decision in favor of one or other of several alternatives. In such a case the procedure of most of us is after this order. We think of one route as being picturesque and wholly novel, but also as being expensive. We think of another as less interesting, but also as less expensive. A third is, we discover, the most expedient, but also the most costly of the three. We find ourselves confronted, then, with the necessity of choosing with regard to the relative merits of cheapness, beauty, and speed. We proceed to consider these points in the light of all our interests, and the decision more or less makes itself. We find, for instance, that we must, under the circumstances, select the cheapest route."[1]

An illustration of the process.

Such a line of thinking is very common to everyone, and one that we carry out in one form or another a thousand times every day we live. When we come to look closely at the steps involved in arriving at a conclusion, we detect a series of judgments. Often not very logically arranged, to be sure, but yet so related that the result is safely reached in the end. We compare our concept of, say, the first route and our concept of picturesqueness, decide they agree, and affirm the judgment, "This route is picturesque." Likewise we arrive at the judgment, "This route is also expensive, it is interesting, etc." Then we take

[1] "Psychology," p. 235.

the other routes and form our judgments concerning them. These judgments are all related to each other in some way, some of them being more intimately related than others. Which ones remain as the significant ones, the ones which are used to solve the problem finally, depends on which concepts are the most vital for us with reference to the ultimate end in view. If time is the chief element, then the form of our reasoning would be something like this: "Two of the routes require more than three days; hence I must take the third route." If economy is the important end, the solution would be as follows: "Two routes cost more than $1,000; I cannot afford to pay more than $800; I therefore must patronize the third route." In both cases it is evident that the conclusion is reached through a comparison of two judgments. This is the essential difference between judgment and reasoning. Whereas judgment discovers relations between concepts, *reasoning discovers relations between judgments, and from this evolves a new judgment which is the conclusion sought.* The example given well illustrates the ordinary method by which we reason to conclusions.

The syllogism.

Logic takes the conclusion, with the judgments on which it is based, and forms the three into what is called a *syllogism,* of which the following is a classical type:

All men are mortal;
Socrates is a man,
Therefore
Socrates is mortal.

The first judgment is in the form of a proposition which is called the *major premise,* because it is general

in its nature, including all men. The second is the *minor premise*, since it deals with a particular man. The third is the *conclusion*, in which a new relation is discovered between Socrates and mortality.

This form of reasoning is *deductive*, that is, it proceeds from the general to the particular. Much of our reasoning is an abbreviated form of the syllogism, and will readily expand into it. For instance, we say, "It will rain to-night, for there is lightning in the west." Expanded into the syllogism form it would be, "Lightning in the west is a sure sign of rain; there is lightning in the west this evening; therefore, it will rain to-night." This is a valuable form of reasoning, but a moment's reflection will show that something must precede the syllogism in our reasoning. *The major premise must be accounted for.* How are we able to say that all men are mortal, and that lightning in the west is a sure sign of rain? How was this general truth arrived at? There is only one way, namely, through the observation of a large number of particular instances, or through *induction.* Deduction.

Induction is the method of proceeding from the particular to the general. Many men are observed, and it is found that all who have been observed have died under a certain age. It is true that not all men have been observed to die, since many are now living, and many more will no doubt come and live in the world whom *we* cannot observe, since mortality will have overtaken us before their advent. To this it may be answered that the men now living have not yet lived up to the limit of their time, and, besides, they have within them the causes working whose inevitable effect has always been and always will be death; likewise with the men yet unborn, they will Induction.

possess the same organism as we, whose very nature necessitates mortality. In the case of the premonitions of rain, the generalization is not so safe, for there have been exceptions. Lightning in the west at night is not always followed by rain, nor can we find inherent causes as in the other case which necessitates rain as an effect.

The necessity for broad induction.

Thus it is seen that our generalizations, or major premises, are of all degrees of validity. In the case of some, as the mortality of man, millions of cases have been observed and no exceptions found, but on the contrary, causes discovered whose operation renders the result inevitable. In others, as, for instance, in the generalization once made, "All cloven-footed animals chew their cud," not only had the examination of individual cases not been carried so far as in the former case when the generalization was made, but there were found no inherent causes residing in cloven-footed animals which make it necessary for them to chew their cud. That is, cloven feet and cud-chewing do not of necessity go together, and the case of the pig disproves the generalization.

The "inductive leap."

In practically no instance, however, is it possible for us to examine every case upon which a generalization is based; after examining a sufficient number of cases, and particularly if there are supporting causes, we are warranted in making the "inductive leap" or in proceeding at once to state our generalization as a working hypothesis. Of course it is easy to see that if we have a wrong generalization, if our major premise is invalid, all that follows in our chain of reasoning will be worthless. This fact should render us careful in making generalizations on too narrow a basis of induction. We may have observed that cer-

tain red-haired people of our acquaintance are quick-tempered, but we are not justified from this in making the general statement that all red-haired people are quick-tempered. Not only have we not examined a sufficient number of cases to warrant such a conclusion, but we have found in the red hair not even a cause of quick temper, but only an occasional concomitant.

The interrelation of induction and deduction.

Induction and deduction must go hand in hand in building up our world of knowledge. Induction gives us the particular facts out of which our system of knowledge is built, furnishes us with the data out of which general truths are formed; deduction allows us to start with the generalization furnished us by induction, and from this vantage ground to organize and systematize our knowledge, and through the discovery of its relations, to unify it and make it usable. Deduction starts with a general truth and asks the question, "What new relations are made necessary among particular facts by this truth?" Induction starts with particulars, and asks the question, "To what general truth do these separate facts lead?" Each method of reasoning needs the other. Deduction must have induction to furnish the facts for its premises; induction must have deduction to organize these separate facts into a unified body of knowledge. "He only sees well who sees the whole in the parts, and the parts in the whole."

EXERCISES

Can you remember how some of your earlier concepts were built up, such as the concept, *horse, city, river?*

What concepts have you now which you are aware are

very meager? What is your concept of *mountain?* How many have you seen?

Have you any concepts which you are working very hard to enrich?

Recall some judgment which you have made and which proved to be false, and see whether you can now discover what was wrong with it. Do you find the trouble to be an inadequate concept?

What constitutes "good judgment"? "poor judgment"?

Did you ever make a mistake in an example in, say, percentage by saying, "This is the base," when it proved not to be? What was the cause of the error?

Can you recall any instance in which you made too hasty a generalization when you had observed but few cases upon which to base your premises? What of your reasoning which followed?

See whether you can show that validity of reasoning rests back ultimately on correct perceptions.

What are you doing at present to increase your power of thinking?

SUGGESTED READINGS

Angell, "Psychology," Chapters X–XII.

Royce, "Outlines of Psychology," Chapters XI and XII.

Dewey, "Psychology," Chapter VIII.

James, "Psychology," Briefer Course, Chapters XIV, XVI, and XXII.

Halleck, "Psychology and Psychic Culture," Chapters VIII and IX.

Schaeffer, "Thinking and Learning to Think," Chapters XVI and XVII.

CHAPTER XI

INSTINCT

The influence of heredity.

Each individual, busied with his own affairs and blinded by his own interests, is likely to take himself for granted and forget that he is a part of a great, unbroken procession of life, which began at the beginning and will go on till the end. Strange indeed would it be if all the generations who have lived, struggled, and died before us, and whose blood flows in our veins had left no impress upon us. We are a part of all that has gone before, and all that comes after us will be a part of us. Each generation receives, through heredity, the products of the long experience through which the race has passed. The generation receiving the gift to-day lives its own brief life, makes its own little contribution to the sum total and then passes on as millions have done before. Through heredity, the passions, the fears, and the tragedies of generations long since moldered to dust stir our blood and tone our nerves for the conflict of to-day.

Instinct the result of race experience.

Every child born into the world has resting upon him an unseen hand reaching out from the past, pushing him out to meet his environment, and guiding him in the start upon his journey. This impelling and guiding power from the past we call *instinct*. In the words of Mosso: "Instinct is the voice of past generations reverberating like a distant echo in the

cells of the nervous system. We feel the breath, the advice, the experience of all men, from those who lived on acorns and struggled like wild beasts, dying naked in the forest, down to the virtue and toil of our father, the fear and love of our mother."

The child is born ignorant and helpless. He has no memory, no reason, no imagination. He has never performed a conscious act, and does not know how to begin. He must get started, but how? He has no experience to direct him, and he is unable to understand or imitate others of his kind. It is at this point that instinct comes to his rescue. The race has not given the child a mind ready made—that must develop; but it has given him a ready-made nervous system, ready to respond with the proper movements when it receives the touch of its environment through the senses. And this nervous system has been so trained during a limitless past that its responses are the ones which are necessary for the welfare of its owner. It can do a hundred things without having to wait to learn them. Burdette says of the newborn child, "Nobody told him what to do. Nobody taught him. He knew. Placed suddenly on the guest list of this old caravansary, he knew his way at once to two places in it—his bedroom and the dining room." A thousand generations of babies had done the same thing in the same way, and each had made it a little easier for this particular baby to do his part without learning how.

Definition of instinct.

Instincts are the tendency to act in certain definite ways, without previous education and without a conscious end in view. They are a tendency to *act*; for some movement, or motor adjustment, is the response to an instinct. They do not require previous *educa-*

tion, for none is possible with many instinctive acts: the duck does not have to be taught to swim or the baby to suck. They have no conscious *end* in view, for the act follows the pressure of the proper stimulus upon the preorganized nervous system as the discharge of a gun follows the pressure of the finger upon the trigger. Says James: "The cat runs after the mouse, runs or shows fight before the dog, avoids falling from walls and trees, shuns fire and water, etc., not because he has any notion either of life or death, or of self, or of preservation. He has probably attained to no one of these conceptions in such a way as to react definitely upon it. He acts in each case separately, and simply because he cannot help it; being so framed that when that particular running thing called a mouse appears in his field of vision he *must* pursue; that when that particular barking and obstreperous thing called a dog appears he *must* retire, if at a distance, and scratch if close by; that he *must* withdraw his feet from water and his face from flame, etc. His nervous system is to a great extent a preorganized bundle of such reactions. They are as fatal as sneezing, and as exactly correlated to their special excitants as it to its own."[1] You ask, Why does the lark rise on the flash of a sunbeam from his meadow to the morning sky leaving a trail of melody to mark his flight? Why does the beaver build his dam, and the oriole hang her nest? Why are myriads of animal forms on the earth today doing what they were countless generations ago? Why does the lover seek the maid, and the mother cherish her young? *Because the voice of the past*

[1] "Psychology," p. 391.

speaks to the present, and the present has no choice but to obey.

Through instinct the individual inherits the habits of the race.

Instincts are the habits of the race which it bequeaths to the individual; the individual takes these for his start, and then modifies them through education, and thus adapts himself to his environment. Through his instincts, the individual is enabled to short-cut racial experience, and begin at once on life activities which the race has been ages in acquiring. Instinct preserves to us what the race has achieved in experience, and so starts us out where the race left off.

Unmodified instinct is blind.

Many of the lower animal forms act on instinct blindly, unable to use past experience to guide their acts, incapable of education. Some of them carry out seemingly marvelous activities, yet their acts are as automatic as those of a machine and as devoid of foresight. A species of mud wasp carefully selects clay of just the right consistency, finds a somewhat sheltered nook under the eaves, and builds its nest, leaving one open door. Then it seeks a certain kind of spider, and, having stung it so as to benumb without killing, carries it into the new-made nest, lays its eggs on the body of the spider so that the young wasps may have food immediately upon hatching out, then goes out and plasters the door over carefully to exclude all intruders. Wonderful intelligence? Not intelligence at all. Its acts were dictated not by plans for the future, but by pressure from the past. Let the supply of clay fail, or the race of spiders become extinct, and the wasp is helpless and its species will perish. Likewise the *race* of bees and ants have done wonderful things, but *individual* bees and ants are very stupid and helpless when confronted by any

novel conditions to which their race has not been accustomed.

Human instincts modified by education.

Man starts in as blindly as the lower animals; but, thanks to his higher mental powers, this blindness soon gives way to foresight, and he is able to formulate purposeful ends and adapt his activities to their accomplishment. Possessing a larger number of instincts than the lower animals have, man finds possible a greater number of responses to a more complex environment than do they. This advantage, coupled with his ability to reconstruct his experience in such a way that he secures constantly increasing control over his environment, easily makes man the superior of all the animals, and enables him to exploit them for his own further advancement.

Instincts appear in succession as required.

It is not well that we should be started on too many different lines of activity at once, hence our instincts do not all appear at the same time. Only as fast as we need additional activities do they ripen. Our very earliest activities are concerned chiefly with feeding, hence we first have the instincts which prompt us to take our food and to cry for it when we are hungry. Also we find useful such abbreviated instincts, called *reflexes*, as sneezing, snuffling, gagging, vomiting, starting, etc.; hence we have the instincts enabling us to do these things. Soon comes the time for teething, and, to help the matter along, the instinct of biting enters, and the rubber ring is in demand. The time approaches when we are to feed ourselves, so the instinct arises to carry everything to the mouth. Now we have grown stronger and must assume an erect attitude, hence the instinct to sit up and then to stand. Locomotion comes next, and with it the instinct to creep and walk. Also a

language must be learned, and we must take part in the busy life about us and do as other people do; so the instinct to imitate arises that we may learn things quickly and easily. We need a spur to keep us up to our best effort, so the instinct of emulation emerges. We must defend ourselves, so the instinct of pugnacity is born. We need to be cautious, hence the instinct of fear. We need to be investigative, hence the instinct of curiosity. Much self-directed activity is necessary for our development, hence the play instinct. It is best that we should come to know and serve others, so the instincts of sociability and sympathy arise. We need to select a mate and care for offspring, hence the instinct of love for the other sex, and the parental instinct. This is far from a complete list of our instincts, and I have not tried to follow the order of their development, but I have given enough to show the origin of many of our life's most important activities.

Many instincts are transitory.

Not only do instincts ripen by degrees, entering our experience one by one as they are needed, but they drop out when their work is done. Some, like the instinct of self-preservation, are needed our lifetime through, hence they remain to the end. Others, like the play instinct, serve their purpose and disappear in a few years, or a few months. The life of the instinct is always as transitory as is the necessity for the activity to which it gives rise. No instinct remains wholly unaltered in man, for it is constantly being made over in the light of each new experience. The instinct of self-preservation is modified by knowledge and experience, so that the defense of the man against threatened danger would be very different from that of the child; yet the instinct to protect oneself in

some way remains. On the other hand, the instinct to romp and play is less permanent. It may last into adult life, but few middle-aged or old people care to race about as do children. Their activities are occupied in other lines, and they require less physical exertion. Contrast with these two examples such instincts as sucking, creeping, and crying, which are much more fleeting than the play instinct, even. With dentition comes another mode of eating, and sucking is no more serviceable. Walking is a better mode of locomotion than creeping, so the instinct to creep soon dies. Speech is found a better way than crying to attract attention to distress, so this instinct drops out. Many of our instincts not only would fail to be serviceable in our later lives, but would be positively in the way. Each serves its day, and then passes over into so modified a form as not to be recognized, or else drops out of sight altogether.

Seemingly useless instincts.

Indeed it is difficult to see that some instincts serve a useful purpose at any time. The pugnacity and greediness of childhood, its foolish fears, the bashfulness of youth—these seem to be either useless or detrimental to development. In order to understand the workings of instinct, however, we must remember that it looks in two directions: into the future for its application, and into the past for its explanation. We should not be surprised if the experiences of a long past have left behind some tendencies which are not very useful under the vastly different conditions of to-day. Nor should we be too sure that an activity whose precise function in relation to development we cannot discover has no function at all. Each instinct must be considered not alone in the light of what it means to its possessor to-day, but of what it means to all his

future development. The tail of a polliwog seems a very useless appendage so far as the adult frog is concerned, yet if the polliwog's tail is cut off a perfect frog never develops.

Instincts must be utilized when they appear if at all.

A man may set the stream to turning his mill wheels to-day or wait for twenty years—the power is there ready for him when he wants it. Instincts must be utilized when they present themselves, else they disappear—never, in most cases, to return. Birds kept caged past the flying time never learn to fly well. The hunter must train his setter when the time is ripe, or the dog can never be depended upon. Ducks kept away from the water until full grown have almost as little inclination for it as chickens. The child whom the pressure of circumstances or unwise authority of parents keeps from mingling with playmates and participating in their plays and games when the social instinct is strong upon him, will in later life find himself a hopeless recluse to whom social duties are a bore. The boy who does not hunt and fish and race and climb at the proper time for these things, will find his taste for them fade away, and he will become wedded to a sedentary life. The youth and maiden must be permitted to " dress up " when the impulse comes to them, or they are likely ever after to be careless in their attire.

Individual habits to grow out of instincts.

Most of our habits have their rise in instincts, and all desirable instincts should be seized upon and transformed into habits before they fade away. Says James in his remarkable chapter on Instinct: " In all pedagogy the great thing is to strike while the iron is hot, and to seize the wave of the pupils' interest in each successive subject before its ebb has come, so that knowledge may be got and a habit of skill acquired—

a headway of interest, in short, secured, on which afterwards the individual may float. There is happy moment for fixing skill in drawing, for making boys collectors in natural history, and presently dissectors and botanists; then for initiating them into the harmonies of mechanics and the wonders of physical and chemical law. Later, introspective psychology and the metaphysical and religious mysteries take their turn; and, last of all, the drama of human affairs and worldly wisdom in the widest sense of the term. In each of us a saturation point is soon reached in all these things; the impetus of our purely intellectual zeal expires, and unless the topic is associated with some urgent personal need that keeps our wits constantly whetted about it, we settle into an equilibrium, and live on what we learned when our interest was fresh and instinctive, without adding to the store." [1]

> There is a tide in the affairs of men
> Which, taken at the flood, leads on to fortune;
> Omitted, all the voyage of their life
> Is bound in shallows and in miseries.

The more important human instincts.

It will be impossible in this brief statement to give a complete catalogue of the human instincts, much less to discuss each in detail. We must content ourselves therefore with naming the more important instincts, and finally discussing a few of them: *Sucking, biting, chewing, clasping objects with the fingers, carrying to the mouth, crying, smiling, sitting up, standing, locomotion, vocalization, imitation, emulation, pugnacity, resentment, anger, sympathy, hunting and fighting, fear, acquisitiveness, play, curiosity,*

[1] "Principles of Psychology," Chapter XXIV.

sociability, modesty, secretiveness, shame, love, and jealousy may be said to head the list of our instincts. It is impossible to draw an exact line between instinctive and emotional reactions, since the one shades over into the other; hence some of the instincts will be mentioned again as emotions. Thus such instincts as anger, fear, and love have also their characteristic emotional expression which is known by the same name as the corresponding instinct. The instincts which we will briefly discuss are *imitation*, *fear*, and *play*.

The instinct of imitation.

No individual enters the world with a large enough stock of instincts to start him doing all the things necessary for his welfare. Instinct prompts him to eat when he is hungry, but does not tell him to use a knife and fork and spoon; it prompts him to use vocal speech, but does not say whether he shall use English, French, or German; it prompts him to be social in his nature, but does not specify that he shall say please and thank you, and take off his hat to ladies. The race did not find the specific *modes* in which these and many other things are to be done of sufficient importance to crystallize them in instincts, hence the individual must learn them as he needs them. The simplest way of accomplishing this is for each generation to copy the ways of doing things which are followed by the older generation among whom they are born. This is done through *imitation. Imitation is the instinct to respond to a suggestion from another by repeating his act.* The instinct of imitation is active in the year-old child, it requires another year or two to reach its height, then it gradually grows less marked, but continues in some degree throughout life. The young child is practically

helpless in the matter of imitation. Instinct demands that he shall imitate, and he has no choice but to obey. His environment furnishes the models which he must imitate, whether they are good or bad. Before he is old enough for intelligent choice, he has imitated a multitude of acts about him; and habit has seized upon these acts and is weaving them into conduct and character. Older grown we may choose what we will imitate, but in our earlier years we are at the mercy of the models which are placed before us.

Imitation gives us language, conduct, and standards.

If our mother tongue is the first we hear spoken, that will be our language; but if we first hear Chinese, we will learn that with almost equal facility. If whatever speech we hear is well spoken, correct, and beautiful, so will our language be; if it is vulgar, or incorrect, or slangy, our speech will be of this kind. If the first manners which serve us as models are coarse and boorish, ours will resemble them; if they are cultivated and refined, ours will be like them. If our models of conduct and morals are questionable, our conduct and morals will be of like type. Our manner of walking, of dressing, of thinking, of saying our prayers, even, originates in imitation. By imitation we adopt ready-made our social standards, our political faith, and our religious creeds. Our views of life and the values we set on its attainments are largely a matter of imitation.

Individuality in imitation.

Yet given the same model, no two of us will imitate precisely alike. Your acts will be yours, and mine will be mine. This is because no two of us have just the same heredity, and hence cannot have precisely similar instincts. There reside in our different personalities different powers of invention and originality, and these determine by how much the

product of imitation will vary from the model. Some remain imitators all their lives, while others use imitation as a means to the invention of better types than the original models. The person who is an imitator only, lacks individuality and initiative; the nation which is an imitator only, is stagnant and unprogressive. While imitation must be blind in both cases at first, it should be increasingly intelligent as the individual or the nation progresses.

Conscious and unconscious imitation.

The much-quoted dictum that "all consciousness is motor" has a direct application to imitation. It only means that *we have a tendency to act on whatever idea occupies the mind.* Think of yawning or of clearing the throat, and the tendency is strong to do these things. We naturally respond to smile with smile and to frown with frown. And even the impressions coming to us from our material environment have their influence on our acts. Our response to these ideas may be a conscious one, as when a boy purposely stutters in order to mimic an unfortunate companion; or it may be unconscious, as when the boy unknowingly falls into the habit of stammering from hearing this kind of speech. The child may consciously seek to keep himself neat and clean so as to harmonize with a pleasant and well-kept home, or he may unconsciously become slovenly and cross-tempered from living in an ill-kept home where constant bickering is the rule. Often we deliberately imitate what seems desirable to us in other people, but probably far the greater proportion of the suggestions to which we respond are received and acted upon unconsciously. In conscious imitation we can select what models we shall imitate, and therefore protect ourselves in so far as our judgment of good and bad

models is valid. In unconscious imitation, however, we are constantly responding to a stream of suggestions pouring in upon us hour after hour and day after day, with no protection but the leadings of our interests as they direct our attention now to this phase of our environment, and now to that.

Influence of environment.

No small part of the influences which mold our lives comes from our material environment. Good clothes, artistic homes, beautiful pictures and decorations, attractive parks and lawns, well-kept streets, well-bound books—all these have a direct moral and educative value; on the other hand, squalor, disorder, and ugliness are an incentive to ignorance and crime. Hawthorne tells in "The Great Stone Face" of the boy Ernest, listening to the tradition of a coming Wise Man who one day is to rule over the Valley. The story sinks deep into the boy's heart, and he thinks and dreams of the great and good man; and as he thinks and dreams, he spends his boyhood days gazing across the valley at a distant mountain side whose rocks and cliffs nature had formed into the outlines of a human face remarkable for the nobleness and benignity of its expression. He comes to love this Face and looks upon it as the prototype of the coming Wise Man, until lo! as he dwells upon it and dreams about it, the beautiful character which its expression typifies grows into his own life, and he himself becomes the long-looked-for Wise Man.

The influence of personality.

More powerful than the influence of material environment, however, is that of other personalities upon us—the touch of life upon life. A living personality contains a power which grips hold of us, electrifies us, inspires us, and compels us to new en-

deavor, or else degrades and debases us. None has failed to feel at some time this life touch, and to bless or curse the day when its influence came upon him. Either consciously or unconsciously such a personality becomes our ideal and model: we idolize it, idealize it, and imitate it, until it becomes a part of us. Not only do we find these great personalities living in the flesh, but we find them also in books, from whose pages they speak to us, and to whose influence we respond. And not in the *great* personalities alone does the power to influence reside. From *every life* which touches ours, a stream of influence great or small is entering our life and helping to mold it. Nor are we to forget that this influence is reciprocal, and that we are reacting upon others up to the measure of the powers that are in us.

The instinct of fear.

Probably in no instinct more than in that of fear can we find the reflections of all the past ages of life in the world, with its manifold changes, its dangers, its tragedies, its sufferings, and its deaths. The fears of childhood "are remembered at every step," and so are the fears through which the race has passed. Says Chamberlain: "Every ugly thing told to the child, every shock, every fright given him, will remain like splinters in the flesh, to torture him all his life long. The bravest old soldier, the most daring young reprobate, is incapable of forgetting them all —the masks, the bogies, ogres, hobgoblins, witches, and wizards, the things that bite and scratch, that nip and tear, that pinch and crunch, the thousand and one imaginary monsters of the mother, the nurse, or the servant, have had their effect; and hundreds of generations have worked to denaturalize the brains

of children. Perhaps no animal, not even those most susceptible to fright, has behind it the fear heredity of the child."

Fear heredity.

President Hall calls attention to the fact that night is now the safest time of the twenty-four hours; serpents are no longer our most deadly enemies; strangers are not to be feared; neither are big eyes or teeth; there is no adequate reason why the wind, or thunder, or lightning should make children frantic as they do. But "the past of man forever seems to linger in his present"; and the child, in being afraid of these things, is only summing up the fear experiences of the race and suffering all too many of them in his short childhood.

Fear of the dark.

Most children are afraid in the dark. Who does not remember the terror of a dark room through which he had to pass, or, worse still, in which he had to go to bed alone, and there lie in a cold perspiration induced by a mortal agony of fright! The unused doors which would not lock, and through which he expected to see the goblin come forth to get him! The dark shadows back under the bed where he was afraid to look for the hidden monster which he was sure was hiding there and yet dare not face! The lonely lane through which the cows were to be driven late at night, while every fence corner bristled with shapeless monsters lying in wait for boys! And that hated dark closet where he was shut up "until he could learn to be good"! And the useless trapdoor in the ceiling. How often have we lain in the dim light at night and seen the lid lift just a peep for ogre eyes to peer out, and, when the terror was growing beyond endurance, close down, only to lift once and again, until from sheer weariness and exhaustion

we fell into a troubled sleep and dreamed of the hideous monster which inhabited the unused garret! Tell me that the old trapdoor never bent its hinges in response to either man or monster for twenty years? I know it is true, and yet I am not convinced. My childish fears have left a stronger impression than proof of mere facts can ever overrule.

Fear of being left alone.

And the fear of being left alone. How big and dreadful the house seemed with the folks all gone! How we suddenly made close friends with the dog or the cat, even, in order that this bit of life might be near us! Or, failing in this, we have gone out to the barn among the chickens and the pigs and the cows, and deserted the empty house with its torture of loneliness. What was there so terrible in being alone? I do not know. I know only that to many children it is a torture more exquisite than the adult organism is fitted to experience.

Fear a serious factor in the child's life.

But why multiply the recollections? They bring a tremor to the strongest of us to-day. Who of us would choose to live through those childish fears again? Dream fears, fears of animals, fears of furry things, fears of ghosts and of death, dread of fatal diseases, fears of fire and of water, of strange persons, of storms, fears of things unknown and even unimagined, but all the more fearful! Would you all like to relive your childhood for its pleasures if you had to take along with them its sufferings? Would the race choose to live its evolution over again? I do not know. But, for my own part, I should very much hesitate to turn the hands of time backward in either case. Would that the adults at life's noonday, in remembering the childish fears of life's morning, might feel a sympathy for the children of to-day,

who are not yet escaped from the bonds of the fear instinct. Would that all might seek to quiet every foolish childish fear, instead of laughing at it or enhancing it!

The instinct of play.

Small use to be a child unless one can play. Says Karl Groos: "Perhaps the very existence of youth is due in part to the necessity for play; the animal does not play because he is young, but he is young because he must play." Play is a constant factor in all grades of animal life. The swarming insects, the playful kitten, the frisking lambs, the racing colt, the darting swallows, the maddening aggregation of blackbirds—these are but illustrations of the common impulse of all the animal world to play. Wherever freedom and happiness reside, there play is found; wherever play is lacking, there the curse has fallen and sadness and oppression reign. Play is the natural rôle in the paradise of youth; it is childhood's chief occupation. To toil without play, places man on a level with the beasts of burden.

Play a necessity.

But why is play so necessary? Why is this impulse so deep-rooted in our natures? Why not compel our young to expend their boundless energy on productive labor? Why all this waste? Why have our child-labor laws? Why not shut recesses from our schools, and so save time for work? Is it true that all work and no play makes Jack a dull boy? Too true. For proof we need but gaze at the dull and lifeless faces of the prematurely old children as they pour out of the factories where child labor is employed. We need but follow the children who have had a playless childhood, into a narrow and barren manhood. We need but to trace back the history of

the dull and brutish men of to-day, and find that they were the playless children of yesterday. Play is as necessary to the child as food, as vital as sunshine, as indispensable as air.

Play results in freedom of initiative.

The keynote of play is *freedom*, freedom of physical activity and mental initiative. In play the child makes his own plans, his imagination has free rein, originality is in demand, and constructive ability is placed under tribute. Here are developed a thousand tendencies which would never find expression in the narrow treadmill of labor alone. The child needs to learn to work; but along with his work must be the opportunity for free and unrestricted activity, which can come only through play. The boy needs a chance to be a barbarian, a hero, an Indian. He needs to ride his broomstick steed on a dangerous raid, and to charge with lath sword the redoubts of a stubborn enemy. He needs to be a leader as well as a follower. In short, without in the least being aware of it, he needs to develop himself through his own activity—he needs freedom to play. If the child be a girl, there is no difference except in the character of the activities employed.

Play trains to work.

And it is precisely out of these play activities that the later and more serious activities of life emerge. Play is the gateway by which we best enter the various fields of the world's work, whether our particular sphere be that of pupil or teacher in the schoolroom, of man in the busy marts of trade or in the professions, or of farmer or mechanic. Play brings the *whole self* into the activity; it trains to habits of independence and individual initiative, to strenuous and sustained effort, to endurance of hardship and fatigue, to social participation and the acceptance of victory

and defeat. And these are the qualities needed by the man of success in his vocation.

Play in education.

These facts make the play instinct one of the most important in education. Froebel was the first to recognize the importance of play, and the kindergarten was an attempt to utilize its activities in the school. The introduction of this new factor into education has been attended, as might be expected, by many mistakes. Some have thought to recast the entire process of education into the form of games and plays, and thus to lead the child to possess the "Promised Land" through aimlessly chasing butterflies in the pleasant fields of knowledge. It is needless to say that they have not succeeded. Others have mistaken the shadow for the substance, and introduced games and plays into the schoolroom which lack the very first element of play; namely, *freedom of initiative and action* on the part of the child. Educational theorists and teachers have invented games and occupations and taught them to the children, who go through with them much as they would with any other task, enjoying the activity but missing the development which would come through a larger measure of self-direction.

Work and play are complements.

Work cannot take the place of play, neither can play be substituted for work. Nor are the two antagonistic, but each is the complement of the other; for the activities of work grow immediately out of those of play, and each lends zest to the other. Those who have never learned to work and those who have never learned to play are equally lacking in their development. Further, it is not the name or character of an activity which determines whether it is play for the participant, but *his attitude toward the activity.* If the activity is performed for its own sake and not for

some ulterior end, if it grows out of the interest of the child and involves the free and independent use of his powers of body and mind, if it is *his*, and not some one's else—then the activity possesses the chief characteristics of play. Lacking these, it cannot be play, whatever else it may be.

Play points to both past and future.

Play, like other instincts, besides serving the present, looks in two directions, into the past and into the future. From the past come the shadowy interests which, taking form from the touch of our environment, determine the character of the play activities. From the future come the premonitions of the activities that are to be. The boy adjusting himself to the requirements of the game, seeking control over his companions or giving in to them, is practicing in miniature the larger game which he will play in business or profession a little later. The girl in her playhouse, surrounded by a nondescript family of dolls and pets, is unconsciously looking forward to a more perfect life when the responsibilities shall be a little more real. So let us not grudge our children the playday of youth. Let us not rob them of one of their chief birthrights—a happy childhood full of blessed play.

The utilizing of instincts

Let us then hear the conclusion of the whole matter. The undesirable instincts do not need encouragement. It is better to let them fade away from disuse. They are echoes from a distant past, and not serviceable in this better present. *The desirable instincts we are to seize upon and utilize as starting points for the development of useful interests, good habits, and the higher emotional life. We should take them as they come, for their appearance is a sure sign that the*

organism is ready for and needs the activity they foreshadow; and, furthermore, if they are not used when they present themselves, they disappear, never to return.

EXERCISES

What instincts have you noticed developing in children? What ones have you observed to fade away? Can you fix the age in both cases?

Apply these questions to your own development as you remember it or can get it by tradition from your elders.

What were your own fear experiences as a child? Do you discover the same in children to-day?

What examples can you recount from your own experience of conscious imitation? of unconscious imitation? of the influence of environment?

What is the application of the preceding question to our school buildings?

Do you know any children who have no opportunity for play? If so, what is the effect on their development?

How is the play instinct utilized in our present-day education? How could it be still further utilized?

Have you ever observed that children under a dozen years of age cannot be depended upon for "team work" in their games? How do you explain this fact?

SUGGESTED READINGS

James, "Psychology," Briefer Course, Chapter XXV.

James, "Principles of Psychology," Chapter XXIV.

Morgan, "Introduction to Comparative Psychology," Chapter XII.

Kirkpatrick, "Fundamentals of Child Study," Chapter IV.

Royce, "Outlines of Psychology," pp. 35–42.

Angell, "Psychology," Chapters XV and XVI.

Gross, "The Play of Man."

Gross, "The Play of Animals."

CHAPTER XII

FEELING AND ITS FUNCTION

The importance of feeling.

To convince a man's head is not enough, you must get hold on his feeling if you would be sure of moving him to action. Often have we known that some certain line of action was right, and yet failed to follow it, because it was unpleasant. When decision was hanging in the balance we have piled up on one side all the motives we could discover: obligation, duty, sense of right, the good opinion of our friends, rewards which will follow, and a dozen others as strong. Then to put on the other side we could find no motive except the one little, *I don't want to;* but this was heavy enough to outweigh all the rest and dictate the decision. Judgment, reason, and experience may unite to tell us that a contemplated course is unwise, and imagination may reveal to us its disastrous consequences, and yet its pleasures so appeal to us that we yield. Our feelings often prove a stronger motive than knowledge and will combined: they are a factor constantly to be reckoned with among our motives.

Definition of feeling.

Feeling is the pleasant or unpleasant side of any state of consciousness. No phase of our mental life is without the feeling element. We look at the rainbow with its beautiful and harmonious blending of colors, and a feeling of pleasure accompanies the sensation; then we turn and gaze at the sun, and a dis-

agreeable feeling is the result. A strong feeling of pleasantness accompanies the experience of the voluptuous warmth of a cozy bed on a cold morning, but the plunge between the icy sheets on the preceding evening was accompanied by the opposite feeling. The touch of a hand may occasion a thrill of ecstatic pleasure, or it may be accompanied by a feeling equally disagreeable. And so on through the whole range of sensation; we not only *know* the various objects about us through sensation and perception, but we also *feel* while we know. Cognition, or the knowing processes, gives us our "whats"; and feeling, or the affective processes, gives us our "hows." What is yonder object? A bouquet. How does it affect you? Pleasureably.

Feeling resulting from sensory processes.

If, instead of the simpler sensory processes which we have just considered, we take the more complex processes, such as memory, imagination, and thinking, the case is no different. Who has not reveled in the pleasure accompanying the memories of past joys? On the other hand, who is free from all unpleasant memories—from regrets, from pangs of remorse? Who has not dreamed away an hour in pleasant anticipation of some desired object, or spent a miserable hour in dreading some calamity which imagination pictured to him? Feeling also accompanies our thought processes. Everyone has experienced the feeling of the pleasure of intellectual victory over some difficult problem which had baffled the reason, or over some doubtful case in which our judgment proved correct. And likewise none have escaped the feeling of unpleasantness which accompanies intellectual defeat. Whatever the contents of our mental stream, "we find in them, everywhere present, a

Feeling resulting from the complex mental processes.

certain color of passing estimate, an immediate sense that they are worth something to us at any given moment, or that they then have an interest to us."

Qualities of feeling.

Feeling has two qualities, or is of two classes, *pleasant* and *unpleasant*. It ranges from the highest ecstasy of pleasure down the scale, through an imaginary zero point where no feeling exists, and then up the scale of the unpleasant until unbearable pain is reached. Nowhere in the scale, however, do we find any other quality of feeling than these two. It is probable that there is so little feeling connected with many of the humdrum and habitual experiences of our everyday lives, that we are but slightly, if at all, aware of a feeling state in connection with them. Yet a state of consciousness with absolutely no feeling side to it is as unthinkable as the obverse side of a coin without the reverse. Some sort of feeling tone or mood is always present. The width of the affective neutral zone—that is, of a feeling state so little marked as not to be discriminated as either pleasant or unpleasant—varies with different persons, and with the same person at different times. It is conditioned largely by the amount of attention given in the direction of feeling, and also on the fineness of the feeling power of discrimination. It is safe to say that the zero range is usually so small as to be negligible.

Feelings seem to be of very different classes,

It is somewhat hard to believe on first thought that feeling comprises but the two classes given. For have we not often felt bad from a toothache, from not being able to take a long-planned trip, from the loss of a dear friend? Surely these are very different classes of feelings! Likewise we have been happy from the very joy of living, from being praised for some well-doing, or from the presence of friend or lover. And

here again we seem to have widely different classes of feelings.

But it is chiefly the knowledge element which varies.

We must remember, however, that feeling is always based on something *known*. It never appears alone in consciousness as *mere* pleasures or pains. The mind must have a basis of cognition in order that we may have something about which to feel. The "what" must precede the "how." What we commonly call a feeling *is a complex state of consciousness in which feeling predominates,* but which has, nevertheless, a *basis of sensation, or memory, or some other cognitive process.* And what varies so greatly in the different cases of the illustrations just given was precisely this knowledge element, and not the feeling element. A feeling of unpleasantness is a feeling of unpleasantness whether it comes from an aching tooth or from the loss of a friend. It may differ in degree, and the entire mental states of which the feeling is a part may differ vastly, but the simple feeling itself is the same.

Mood, or feeling tone.

The sum total of all the feeling accompanying the various sensory and thought processes at any given time constitutes what we may call our *feeling tone.* During most of our waking hours, and, indeed, during our sleeping hours as well, a multitude of sensory currents are pouring into the cortical centers. At the present moment we can hear the rumble of a wagon, the chirp of a cricket, the chatter of distant voices, and a hundred other sounds besides. At the same time the eye is appealed to by an infinite variety of stimuli in light, color, and objects; the skin responds to many contacts and temperatures; and every other type of end organ of the body is acting as a "sender" to telegraph a message in to the brain. Add to these the powerful currents which are con-

Conditioned by aggregate of nerve currents.

stantly being sent to the cortex from the visceral organs—those of respiration, of circulation, of digestion and assimilation. And then finally add the central processes which accompany the flight of images through our minds—our meditations, memories, and imaginings, our cogitations and volitions. Thus we see what a complex our feelings must be, and how impossible to have any moment in which some feeling is not present as a part of our mental stream. It is this complex, now made up chiefly on the basis of the sensory currents coming in from the end organs or the visceral organs, and now on the basis of those in the cortex connected with our thought life, which constitutes the entire feeling tone, or *mood*.

Mood colors all our thinking,

Mood depends on the character of the aggregate of nerve currents entering the cortex, and changes as the character of the current varies. If the currents run on much the same from hour to hour, then our mood is correspondingly constant; if the currents are variable, our mood also will be variable. Not only is mood dependent on our sensations and thoughts for its quality, but it in turn colors our entire mental life. It serves as a background or setting whose hue is reflected over all our thinking. Let the mood be somber and dark, and all the world looks gloomy; on the other hand, let the mood be bright and cheerful, and the world puts on a smile. It is told of one of the early circuit riders among the New England ministry, that he made the following entries in his diary, thus well illustrating the point: "Wed. Eve. Arrived at the home of Bro. Brown late this evening, hungry and tired after a long day in the saddle. Had a bountiful supper of cold pork and beans, warm bread, bacon and eggs, coffee, and rich pastry. I go to rest feeling that

my witness is clear; the future is bright; I feel called to a great and glorious work in this place. Bro. Brown's family are godly people." The next entry was as follows: "Thur. Morn. Awakened late this morning after a troubled night. I am very much depressed in soul; the way looks dark; far from feeling called to work among this people, I am beginning to doubt the safety of my own soul. I am afraid the desires of Bro. Brown and his family are set too much on carnal things." A dyspeptic is usually a pessimist, and an optimist always keeps a bright mood.

And influences our judgments and decisions.

Mood influences our judgments and decisions. The prattle of children may be grateful music to our ears when we are in one mood, and excruciatingly discordant noise when we are in another. What appeals to us as a good practical joke one day, may seem a piece of unwarranted impertinence on another. A proposition which looks entirely plausible under the sanguine mood induced by a persuasive orator, may appear wholly untenable a few hours later. Decisions which seemed warranted when we were in an angry mood, often appear unwise or unjust when we have become more calm. Motives which easily impel us to action when the world looks bright, fail to move us when the mood is somber. The feelings of impending peril and calamity which are an inevitable accompaniment of the "blues," are speedily dissipated when the sun breaks through the clouds and we are ourselves again.

Mood influences effort.

A bright and hopeful mood quickens every power and enhances every effort, while a hopeless mood limits power and cripples effort. The football team which goes into the game discouraged never plays to the limit. The student who attacks his lesson under the conviction of defeat can hardly hope to succeed, while

the one who enters upon his work confident of his power to master it has the battle already half won. The world's best work is done not by those who live in the shadow of discouragement and doubt, but by those in whose breast hope springs eternal. The optimist is a benefactor of the race if for no other reason than the sheer contagion of his hopeful spirit; the pessimist contributes neither to the world's welfare nor its happiness. Youth's proverbial enthusiasm and dauntless energy rest upon the supreme hopefulness which characterizes the mood of the young.

Disposition a resultant of moods.

The sum total of our moods gives us our *dispositions*. Whether these are pleasant or unpleasant, cheerful or gloomy, will depend on the predominating character of the moods which enter into them. As well expect to gather grapes of thorns or figs of thistles, as to secure a desirable disposition out of undesirable moods. A sunny disposition never comes from gloomy moods, nor a hopeful one out of the "blues." And it is our disposition, more than the power of our reason which, after all, determines our desirability as friends and companions. The person of surly disposition can hardly make a desirable companion, no matter what his intellectual qualities may be. We may live very happily with one who cannot follow the reasoning of a Newton, but it is hard to live with a person chronically subject to "black moods." Nor can we put the responsibility for our dispositions off on our ancestors. They are not an inheritance, but a growth. Slowly, day by day, and mood by mood, we build up our dispositions until finally they come to characterize us.

Temperament.

Some are, however, more predisposed to certain types of mood than are others. The organization of

our nervous system which we get through heredity undoubtedly has much to do with the feeling tone into which we most easily fall. We call this predisposition *temperament*. On the effects of temperament, our ancestors must divide the responsibility with us. I say *divide* the responsibility, for even if we find ourselves predisposed toward a certain undesirable type of moods, there is no reason why we should give up to them. Even in spite of hereditary predispositions, we can still largely determine for ourselves what our moods, and hence our dispositions, are to be. If we have a tendency toward cheerful, quiet, and optimistic moods, the psychologist names our temperament the *sanguine*; if we are easily excited and irritable, with a tendency toward sullen or angry moods, the *choleric*; if we are given to frequent fits of the "blues," if we usually look on the dark side of things and have a tendency toward moods of discouragement and the "dumps," the *melancholic*; if hard to rouse, and given to indolent and indifferent moods, the *phlegmatic*. Whatever be our temperament, it is one of the most important factors in our character.

Sentiments.

Besides the more or less transitory feeling states which we have called moods, there exists also a class of feelings which contain more of the complex intellectual element, are withal of rather a higher nature, and much more permanent than our moods. We call these our *sentiments*. Our sentiments comprise the somewhat constant level of feeling mixed with cognition, which we name *sympathy*, *friendship*, *love*, *patriotism*, *religious faith*, *selfishness*, *pride*, *vanity*, *etc.* Like our dispositions, our sentiments are a growth of months and years. Unlike our dispositions, however, our sentiments are relatively independent of

the physiological undertone which accompanies and becomes a part of our experience, and depend more largely upon the intellectual element as a basis. A sluggish liver might throw us into an irritable mood and, if the condition were long continued, might result in a surly disposition; but it would hardly permanently destroy one's patriotism and make him turn traitor to his country.

How sentiments develop

Sentiments have their beginning in concrete experiences in which feeling is a predominant element, and grow through the multiplication of these experiences much as the concept is developed through many percepts. There is a residual element left behind each separate experience in both cases. In the case of the concept the residual element is intellectual, and in the case of the sentiment it is a complex in which the feeling element is predominant. How this comes about is easily seen by means of an illustration or two. The mother feeds her child when he is hungry, and an agreeable feeling is produced; she puts him into the bath and snuggles him in her arms, and the experiences are pleasant. The child comes to look upon the mother as one whose especial function is to make things pleasant for him, so he comes to be happy in her presence, and long for her in her absence. He finally grows to love his mother not alone for the countless times she has given him pleasure, but for what she herself is. The feelings connected at first wholly with pleasant experiences coming through the ministrations of the mother, strengthened no doubt by instinctive tendencies toward affection, and later enhanced by a fuller realization of what a mother's care and sacrifice mean, grow at last into a deep, forceful, abiding sentiment of love for the mother.

From experiences.

Likewise with the sentiment of patriotism. In so far as our patriotism is a true patriotism and not a noisy clamor, it had its rise in feelings of gratitude and love when we contemplated the deeds of heroism and sacrifice for the flag, and the blessings which come to us from our relations as citizens to our country. If we have had concrete cases brought to our experience, as, for example, our property saved from destruction at the hands of a mob or our lives saved from a hostile foreign foe, the patriotic sentiment will be all the stronger. So we may carry the illustration into all the sentiments. Our religious sentiments of adoration, love, and faith have their origin in our belief in the care, love, and support from a higher Being typified to us as children by the care, love, and support of our parents. Pride arises from the appreciation or overappreciation of oneself, his attainments, or his belongings. Selfishness has its genesis in the many instances in which pleasure results from ministering to self. In all these cases it is seen that our sentiments develop out of our experiences; they are the permanent but ever-growing results which we have to show for experiences which are somewhat long continued, and in which a certain feeling quality is a strong accompaniment of the cognitive part of the experience.

The influence of sentiment.

Our sentiments, like our dispositions, are not only a natural growth from the experiences upon which they are fed, but they in turn have large influence in determining the direction of our further development. Our sentiments furnish the soil which is either favorable or hostile to the growth of new experiences. One in whom the sentiment of true patriotism is deep-rooted will find it much harder to respond to a sug-

gestion to betray his country's honor on battlefield, in legislative hall, or in private life, than one lacking in this sentiment. The boy who has a strong sentiment of love for his mother will find this a restraining influence in the face of temptation to commit deeds which would wound her feelings. A deep and abiding faith in God is fatal to the growth of pessimism, distrust, and a self-centered life. One's sentiments are a safe gauge of his character. Let us know a man's sentiments on religion, morality, friendship, honesty, and the other great questions of life, and little remains to be known. If he is right on these, he may well be trusted in other things; if he is wrong on these, there is little to build upon.

In our personal lives.

Literature has drawn its best inspiration and choicest themes from the field of our sentiments. The sentiment of friendship has given us our David and Jonathan, our Damon and Pythias, and our Tennyson and Hallam. The sentiment of love has inspired countless masterpieces; without its aid most of our fiction would lose its plot, and most of our poetry its charm. Religious sentiment inspired Milton to write the world's greatest epic, "Paradise Lost." The sentiment of patriotism has furnished an inexhaustible theme for the writer and the orator. Likewise if we go into the field of music and art, we find that the best efforts of the masters are clustered around some human sentiment which has appealed to them, and which they have immortalized by expressing it on canvas or in marble, that it may appeal to others and cause the sentiment to grow in them.

In literature and art.

The sentiments furnish the deepest, the most constant, and the most powerful motives which control our lives. Such sentiments as patriotism, liberty, and

Sentiments as motives.

religion have called a thousand armies to struggle and die on ten thousand battlefields, and have given martyrs courage to suffer in the fires of persecution. Sentiments of friendship and love have prompted countless deeds of self-sacrifice and loving devotion. Sentiments of envy, pride, and jealousy have changed the boundary lines of nations, and have prompted the committing of ten thousand unnamable crimes. Slowly day by day from the cradle to the grave we are weaving into our lives the threads of sentiment, which at last become so many cables to bind us to good or evil.

Interest and emotion each to have a chapter.

The feeling which we call *interest* is so important as a motive in our lives, and so colors our acts and determines our endeavors, that we will devote another discussion to this topic. Following this we shall have to consider the still more complex feelings, the *emotions.*

EXERCISES

Mention sensations which are pleasant; which are unpleasant.

Are you subject to changing moods? If so, what is their character? Can you account for these changes?

Can you recall an instance in which some dark mood was caused by a physical condition? What is your characteristic mood in the morning after sleeping in an ill-ventilated room? After eating indigestible food at a late hour?

What do you do to keep from having the "blues"? To get out of them when you once have them?

What kind of disposition do you think you have? How did you get it?

Can you classify your temperament from the four types given? Is it possible that one may have a temperament which none of these classes describes? Do you know any-

thing in your heredity which would account for your temperament?

Can you measure more or less accurately the extent to which your feelings act as motives in your life? Are feelings alone a safe guide?

Make a list of the sentiments which should be cultivated; of those which should be discouraged.

Now make a list of those which you are cultivating, and of those which you are trying to suppress.

What sentiments prompted the Pilgrims to come to America? What sentiments prompted the colonists to take up arms against England?

Mention other historical events or incidents and discover the sentiments which prompted them.

Apply the same test to various cases of individual action.

SUGGESTED READINGS

Angell, " Psychology," Chapters XIII and XIV.
Murray, " An Introduction to Psychology," Part II.
Ribot, " The Psychology of the Emotions," Introduction.
Dewey, " Psychology," Chapter X.
Royce, " Outlines of Psychology," Chapter VII.

CHAPTER XIII

INTEREST

Interest a selective agent among other acts.

We saw in the last discussion that personal habits have their rise in race habits or instincts. Let us now see how interest helps the individual to select from his instinctive acts those which are useful to build into personal habits. Instinct impartially starts the child in the performance of many different activities, but does not dictate what particular acts shall be retained, and hence serve as the basis for habits. Interest comes in at this point and says, "This act is of more value than that act; continue this act and drop that." Instinct prompts the babe to countless movements of body and limb. Interest picks out those which are most vitally connected with the welfare of the organism, and the child comes to prefer these rather than the others. Thus it is that out of the random movements of arms and legs and head and body we finally develop the coördinated activities which are infinitely more useful than the random ones were. And these activities, originating in instincts, and selected by interest, are soon crystallized into habits.

True when applied to our thinking.

The same truth holds for mental activities as for physical. A thousand channels lie open for your stream of thought at this moment, but your interest has beckoned it into the one particular channel which, for the time, at least, appears of the greatest subjective value; and it is now following that channel unless

your will has compelled it to leave that for another. Your thinking as naturally follows your interest as the needle does the magnet, hence your thought activities are conditioned largely by your interests. This is equivalent to saying that your mental habits rest back finally upon your interests.

The nature of interest.

Everyone knows what it is to be interested; but interest, like other elementary states of consciousness, cannot be rigidly defined. (1) Subjectively considered, interest may be looked upon as *a feeling attitude which assigns our activities their place in a subjective scale of values, and hence selects among them.* (2) Objectively considered, *an interest is the object which calls forth the feeling.* (3) Functionally considered, interest *is the dynamic phase of consciousness.*

Interest gives us a subjective scale of values.

If you are interested in driving a horse rather than in riding a bicycle, it is because the former has a greater subjective value to you than the latter. If you are interested in reading these words instead of thinking about the next social function or the last picnic party, it is because at this moment the thought suggested appeals to you as of more value than the other lines of thought. From this it follows that your standards of values are revealed in the character of your interests. The young man who is interested in the race track, in gaming, and in low resorts confesses by this fact that these things occupy a high place among the things which appeal to him as subjectively valuable. The mother whose interests are chiefly in clubs and other social organizations places these higher in her scale of values than her home. The reader who can become interested only in light, trashy literature must admit that matter of this type ranks higher in his subjective scale of values than the works

of the masters. Teachers and students whose strongest interest is in grade marks value these more highly than true attainment. For, whatever may be our claims or assertions, interest is finally an infallible barometer of the values we assign to our activities.

The objective side of interest.

In the case of some of our feelings it is not always possible to ascribe an objective side to them. A feeling of *ennui,* of impending evil, or of bounding vivacity, may be produced by an unanalyzable complex of causes. But interest, while it is related primarily to the activities of the self, is carried over from the activity to the *object* which occasions the activity. That is, interest has both an *objective* and a *subjective* side. On the subjective side a certain activity connected with self-expression is worth so much; on the objective side a certain object is worth so much as related to this self-expression. Thus we say, I have an interest in books or in business; my daily activities, my self-expression, are governed with reference to these objects. They are my interests.

Interest is dynamic.

Many of our milder feelings terminate within ourselves, never attaining sufficient force as motives to impel us to action. Not so with interest. Its very nature is dynamic. Whatever it seizes upon becomes *ipso facto* an object for some activity, for some form of expression of the self. Are we interested in a new book, we must read it; in a new invention, we must see it, handle it, test it; in some vocation or avocation, we must pursue it. Interest is impulsive. It gives its possessor no opportunity for lethargic rest and quiet, but constantly urges him to action. Grown ardent, interest becomes *enthusiasm,* "without which," says Emerson, "nothing great was ever accomplished." Are we an Edison, with a strong interest centered in

mechanical invention, it will drive us day and night in a ceaseless activity which scarcely gives us time for food and sleep. Are we a Lincoln, with an undying interest in the Union, this motive will make possible superhuman efforts for the accomplishment of our end. Are we a Luther, swayed by an unflagging interest in the reformation of a church, miracles of achievement will follow our untiring efforts. Are we man or woman anywhere, in any walk of life, so we are dominated by mighty interests grown into enthusiasm for some object, we shall find great purposes growing within us, and our life will be one of activity and achievement. On the contrary, a life which has developed no great interest lacks motive power. Of necessity such a life must be devoid of purpose and hence barren of results, counting little while it is being lived, and little missed by the world when it is gone.

Habit antagonistic to interest.

While, as we have seen, interest is necessary to the formation of habits, yet habits once formed are antagonistic to interest. That is, acts which are so habitually performed that they " do themselves " are accompanied by a minimum of interest. They come to be done without attentive consciousness, hence interest cannot attach to their performance. Many of the activities which make up the daily round of our lives are of this kind. As long as habit is being modified in some degree, as long as we are improving in our ways of doing things, interest will still cling to the process; but let us once settle into an unmodified rut, and interest quickly fades away. We then have the conditions present which make of us either a machine or a drudge.

We may have an interest either (1) in the *doing* of an act, or (2) in the end sought through the doing.

In the first instance we call the interest *immediate*, or *direct*; in the second instance, *mediate*, or *indirect*. If in our work we do not find an interest *in the doing*, or if it has become positively disagreeable so that we loathe its performance, then there must be some *ultimate end* for which the task is being performed, and in which there is a strong interest, else the whole process will be the veriest drudgery. If the end is sufficiently interesting it may serve to throw a halo of interest over the whole process connected with it. The following instance illustrates this fact: A twelve-year-old boy was told by his father that if he would make the box of an automobile at his bench in the manual training school, the father would purchase the running gear for it and give the machine to the boy. In order to secure the coveted prize, the boy had to master the arithmetic necessary for making the calculations, and the drawing necessary for making the plans to scale before the teacher in manual training would allow him to take up the work of construction. The boy had always lacked interest in both arithmetic and drawing, and consequently was dull in them both. Under this incentive, however, he took hold of them with such avidity that he soon surpassed all the remainder of the class, and was able to make his calculations and drawings within a term. He secured his automobile a few months later, and still retained his interest in arithmetic and drawing.

Two types of interest.

Interest of the indirect type, which does not attach to the process, but comes from some more or less distant end, most of us find much less potent than interest which is immediate. This is especially true unless the end be one of intense desire and not too distant. The assurance to a boy that he must get his

Indirect interest as a motive.

lessons well because he will need to be an educated man ten years hence when he goes into business for himself does not compensate for the lack of interest in the lessons of to-day.

Yet it is necessary in the economy of life that both children and adults should learn to work under the incitement of indirect interests. Much of the work we do is for an end which is more desirable than the work itself. It will always be necessary to sacrifice present pleasure for future good. Ability to work cheerfully for a somewhat distant end saves much of our work from becoming mere drudgery. If interest is removed from *both* the process and the end, no inducement is left to work except compulsion; and this if continued, results in the lowest type of effort. It puts a man on a level with the beast of burden, which constantly shirks its work.

Indirect interest alone insufficient.

Interest coming from an end instead of inhering in the process may finally lead to an interest in the work itself; but if it does not, the worker is in danger of being left a drudge at last. To be more than a slave to his work one must ultimately find the work worth doing *for its own sake.* The man who performs his work *solely* because he has a wife and babies at home will never be an artist in his trade or profession; the student who masters a subject *only* because he must know it for an examination is not developing the traits of a scholar. The question of interest in the process makes the difference between the one who works because he loves to work and the one who toils because he must—it makes the difference between the artist and the drudge. The drudge does only what he must when he works, the artist all he can. The drudge longs for the end of labor, the

artist for it to begin. The drudge studies how he may escape his labor, the artist how he may better his and ennoble it.

Labor without interest is drudgery.

To labor when there is joy in the work is elevating, to labor under the lash of compulsion is degrading. It matters not so much what a man's occupation as how it is performed. A coachman driving his team down the crowded street better than anyone else could do it, and glorying in that fact, may be a true artist in his occupation, and be ennobled through his work. A statesman molding the affairs of a nation as no one else could do it, or a scholar leading the thought of his generation is subject to the same law; in order to secure the best and highest personal development from the activities in which he is engaged, and in order to give the best grade of service of which he is capable, man must find a joy in the performance of the work as well as in the end sought through its performance. No matter how high the position or how refined the work, the worker becomes a slave to his labor unless interest in its performance saves him.

Interests like instincts ripen and fade away.

Since our interests are always connected with our activities, it follows that many interests will have their birth, grow to full strength, and then fade away as the corresponding instincts which are responsible for the activities pass through these stages. This only means that interest in play develops at the time when the play activities are seeking expression; that interest in the opposite sex becomes strong when instinctive tendencies are directing the attention to the choice of a mate; and that interest in abstract studies comes when the development of the brain enables us to carry on logical trains of thought. All of us can recall many interests which were once strong, and are

now weak or else have altogether passed away. Hide-and-seek, Pussy-wants-a-corner, excursions to the little fishing pond, securing the colored chromo at school, the care of pets, reading blood-and-thunder stories or sentimental ones—interest in these things belongs to our past, or has left but a faint shadow. Others have come, and these in turn will also disappear and other new ones yet appear as long as we keep on acquiring new experience.

Hence they must be utilized when they appear.

Of course this means that we must take advantage of interests when they appear if we wish to utilize and develop them. How many people there are who at one time felt an interest impelling them to cultivate their taste for music, art, or literature and said they would do this at some convenient season, and finally found themselves without a taste for these things! How many of us have felt an interest in some benevolent work, but at last discovered that our inclination had died before we found time to help the cause! How many of us, young as we are, do not at this moment lament the passing of some interest from our lives, or are now watching the dying of some interest which we had fondly supposed was as stable as Gibraltar? The drawings of every interest which appeals to us is a voice crying, "Now is the appointed time!" What impulse urges us to-day to become or do, we must begin at once to be or perform if we would attain to the coveted end.

The value of a strong interest.

Nor are we to look upon these transitory interests as useless. They come to us not only as a race heritage, but they impel us to activities which are immediately useful, or else prepare us for the later battles of life. But even aside from this important fact it is worth everything just to *be interested.* For it is

only through the impulsion of interest that we first learn to put forth effort in any true sense of the word, and interest furnishes the final foundation upon which volition rests. Without interest the greatest powers may slumber in us unawakened, and abilities capable of the highest attainment rest satisfied with commonplace mediocrity. No one will ever know how many Gladstones and Leibnitzes the world has lost simply because their interests were never gotten hold of in such a way as to start them on the road to achievement. It matters less what the interest be, so it be not bad, than that there shall be some great interest to compel endeavor, test the strength of endurance, and lead to habits of achievement.

The necessity for selection among our interests.

I said early in the discussion that interest is selective among our activities, picking out those which appear to be of the most value to us. In the same manner there must be a selection among our interests themselves. It is possible for us to become interested in so many lines of activity that we do none of them well. This leads to a life so full of hurry and stress that we forget life in our busy living. Says James with respect to the necessity of making a choice among our interests: "With most objects of desire, physical nature restricts our choice to but one of many represented goods, and even so it is here. I am often confronted by the necessity of standing by one of my empirical selves and relinquishing the rest. Not that I would not, if I could, be both handsome and fat, and well dressed, and a great athlete, and make a million a year; be a wit, a *bon vivant*, and a lady-killer, as well as a philosopher; a philanthropist, statesman, warrior, and African explorer, as well as a 'tone poet' and saint. But the thing is simply im-

possible. The millionaire's work would run counter to the saint's; the *bon vivant* and the philosopher would trip each other up; the philosopher and the lady-killer could not well keep house in the same tenement of clay. Such different characters may conceivably at the outset of life be alike possible to man. But to make any one of them actual, the rest must more or less be suppressed. So the seeker of his truest, strongest, deepest self must review the list carefully, and pick out the one on which to stake his salvation."

Interests may be too narrow.

On the other hand, it is just as possible for our interests to be too narrow as too broad. The one who has cultivated no interests outside of his daily round of humdrum activities does not get enough out of life. It is possible to become so engrossed with making a living that we forget to live—to become so habituated to some narrow treadmill of labor with the limited field of thought suggested by its environment, that we miss the richest experiences of life. Many there are who live a barren, trivial, and self-centered life because they fail to see the significant and the beautiful which lie just beyond where their interests reach! Many there are so taken up with their own petty troubles that they have no heart of sympathy for fellow humanity! Many there are so absorbed with their own little achievements that they fail to catch step with the progress of the age!

Specialization in interests should not come too early.

It is not well to specialize too early in our interests. We miss too many rich fields which lie ready for the harvesting, and whose gleaning would enrich our lives. The student who is so buried in books that he has no time for athletic recreations or social diversions is making a mistake equally with the one who is so enthusiastic an athlete and social devotee that he

neglects his studies. Likewise, the youth who is so taken up with the study of one particular line that he applies himself to this at the expense of all other lines is inviting a distorted growth. Youth is the time for pushing the sky line back on all sides; it is the time for cultivating diverse and varied lines of interests if we would grow into a rich experience in our later lives. The physical must be developed, but not at the expense of the mental, and *vice versa*. The social must not be neglected, but it must not be indulged to such an extent that other interests suffer. Interest in amusements and recreations should be cultivated, but these should never run counter to the moral and religious. Specialization is necessary, but specialization in our interests should rest upon a broad field of fundamental interests, in order that the selection of the special line may be an intelligent one, and that our specialty shall not prove a rut in which we become so deeply buried that we are lost to the best in life.

A proper balance to be sought among our interests.

It behooves us, then, to find a proper balance in cultivating our interests, making them neither too broad nor too narrow. We should deliberately seek to discover those which are strong enough to point the way to a life vocation, but this should not be done until we have had an opportunity to become acquainted with various lines of interests. Otherwise our decision in this important matter may be based merely on a whim. We should also decide what interests we should cultivate for our own personal development and happiness, and for the service we are to render in a sphere outside our immediate vocation. We should consider avocations as well as vocations. Whatever interests are selected should be carried to efficiency. Better a

reasonable number of carefully selected interests well developed and resulting in efficiency than a multitude of interests which lead us into so many fields that we can at best get but a smattering of each, and that by neglecting the things which should mean the most to us. Our interests should lead us to live what Wagner calls a "simple life," but not a narrow one.

Interest not antagonistic to effort,

Some educators have feared that in finding our occupations interesting, we shall lose all power of effort and self-direction; that the will, not being called sufficiently into requisition, must suffer from non-use; that we shall come to do the interesting and agreeable things well enough, but fail before the disagreeable. This question will be discussed more fully in the chapter on the will, but one or two observations are in place here. In the first place it may be said that the development of the will does not come through our being forced to do acts in which there is absolutely no interest. Work done under compulsion never secures the full self in its performance. It is done mechanically and usually under such a spirit of rebellion on the part of the doer, that the advantage of such training may well be doubted. Nor are we safe in assuming that tasks done without interest as the motive are always performed under the direction of the will. It is far more likely that they are done under some external compulsion, and that the will has, after all, but very little to do with it. A boy may get an uninteresting lesson at school without much pressure from his will, providing he is sufficiently afraid of the master. In order that the will may receive training through compelling the performance of certain acts, it must have a reasonably free field, with external pressure re-

moved. The compelling force must come from within, and not from without.

But should result in a strong will.

On the other hand, there is not the least danger that we shall ever find a place in life where all the disagreeable is removed, and all phases of our work made smooth and interesting. The necessity will always be rising to call upon effort to take up the fight and hold us to duty where interest has failed. And it is just here that there must be no failure, else we shall be mere creatures of circumstance, drifting with every eddy in the tide of our life, and never able to breast the current. Interest is not to supplant the necessity for stern and strenuous endeavor, but rather to call forth the largest measure of endeavor of which the self is capable. It is to put at work a larger amount of power than can be secured in any other way; in place of supplanting the will, it is to give it its point of departure and render its service all the more effective.

Interest and character.

Finally, we are not to forget that bad interests have the same propulsive power as good ones, and will lead to acts just as surely. And these acts will just as readily be formed into habits. It is worth noticing that *back of the act lies an interest; in the act lies the seed of a habit; ahead of the act lies behavior, which grows into conduct, this into character, and character into destiny.* Bad interests should be shunned and discouraged. But even that is not enough. Good interests must be installed in the place of the bad ones from which we wish to escape, for it is through substitution rather than suppression that we are able to break from the bad and adhere to the good.

Our interests are an evolution. Out of the simple interests of the child grow the more complex interests

The evolution of our interests.

of the man. Lacking the opportunity to develop the interests of childhood, the man will come somewhat short of the full interests of manhood. The great thing, then, in educating a child is to discover the fundamental interests which come to him from the race and, using these as a starting point, direct them into constantly broadening and more serviceable ones. Out of the early interest in play is to come the later interest in work; out of the early interest in collecting treasure boxes full of worthless trinkets and old scraps comes the later interest in earning and retaining ownership of property; out of the interest in chums and playmates comes the larger social interests; out of interest in nature comes the interest of the naturalist. And so one by one we may examine the interests which bear the largest fruit in our adult life, and we find that they all have their roots in some early interest of childhood, which was encouraged and given a chance to grow.

Order of development of our interests.

The order in which our interests develop thus becomes an important question in our education. Nor is the order an arbitrary one, as might appear on first thought; for interest follows the invariable law of attaching to the activity for which the organism is at that time ready, and which it then needs in its further growth. That we are sometimes interested in harmful things does not disprove this assertion. The interest in its fundamental aspect is good, and but needs more healthful environment or more wise direction. While space forbids a full discussion of the genetic phase of interest here, yet we may profit by a brief statement of the fundamental interests of certain well-marked periods in our development.

The interests of early childhood are chiefly con-

nected with ministering to the wants of the organism as expressed in the appetites, and in securing control of the larger muscles. Activity is the preëminent thing—racing and romping are worth doing for their own sake alone. Imitation is strong, curiosity is rising, and imagination is building a new world. Speech is a joy, language is learned with ease, and rhyme and rhythm become second nature. The interests of this stage are still very direct and immediate. A distant end does not attract. The thing must be worth doing for the sake of the doing. Since the child's life at this age is so full of action, and since it is out of acts that habits grow, it is doubly desirous during this period that environment, models, and teaching should all direct his interests and activities into lines which will lead to permanent values.

The interests of early childhood.

In the period from second dentition to puberty there is a great widening in the scope of interests, as well as a noticeable change in their character. Activity is still the keynote; but the child is no longer interested *merely* in the doing, but is now able to look forward to the end sought. Interests which are somewhat indirect now appeal to him, and the *how* of things attracts his attention. He is beginning to reach outside of his own little circle, and is ready for handicraft, reading, history, and science. Spelling, writing, and arithmetic interest him partly from the activities involved, but more as a means to an end. The interest in complex games and plays increases, but the child is not yet ready for games which require team work. He has not come to the point where he is willing to sacrifice himself for the good of all. Interest in moral questions is beginning, and right and wrong are no longer things which may or may not be done without

The interests of later childhood.

rebuke or punishment. The great problem at this stage is *to direct the interest into ways of adapting the means to the end, and into willingness to work under voluntary attention for the accomplishment of the desired end.*

The interests of adolescence.

Finally, with the advent of puberty, comes the last stage in the development of interest before adult life. This period is not marked by the birth of new interests so much as by a deepening and broadening of those already begun. The end becomes an increasingly larger factor, whether in play or in work. The activity itself no longer satisfies. The youth can now play team games; for his social interests are taking shape, and he can subordinate himself for the good of the group. Interest in the opposite sex takes on a new phase, and social form and mode of dress receive attention. A new consciousness of self emerges, and the youth becomes introspective. Questions of the ultimate meaning of things press for solution, and What and who am I? demands an answer. At this age we pass from a *régime* of obedience to one of self-control, from an ethics of authority to one of individualism. All the interests are now taking on a more definite and stable form, and are looking seriously toward life vocations. This is a time of big plans and strenuous activity. It is a crucial period in our life, fraught with pitfalls and dangers, with privileges and opportunities. At this strategic point in our life's voyage we may anchor ourselves with right interests to a safe manhood and a successful career; or we may, with wrong interests, bind ourselves to a broken life of discouragement and defeat.

EXERCISES

Try making a list of ten of your most important interests in the order of their strength.

Suppose you had made such a list five years ago, where would it have differed from the present list?

Are you ever obliged to perform any activities in which you have *no* interest, either directly or indirectly?

Can you name any activities in which you once had a strong interest but which you now perform chiefly from force of habit and without much interest?

Are you more interested in play than in work? If so, why?

Have you any interests of which you are somewhat ashamed? On the other hand, do you lack certain interests which you feel that you should possess?

What interests are you now trying especially to cultivate? to suppress?

Have you as broad a field of interests as you can well take care of?

Have you so many interests that you are slighting the development of some of the more important ones?

SUGGESTED READINGS

James, "Talks to Teachers," Chapter X.

DeGarmo, "Interest and Education," Chapters I–III.

King, "Psychology of Child Development," Chapters XII–XIV.

Angell, "Psychology," Chapter XXI.

Dewey, "Interest as Related to Will," Herbart Year Book for 1895, Second Supplement.

CHAPTER XIV

THE EMOTIONS

The relation of instinct and emotion.

INSTINCTS and emotions are inextricably bound together. Every instinctive act has its feeling side, and every emotion has its instinctive type of expression. Some stimulus comes to us from the external world, and instinctively we respond in a characteristic way; accompanying these physical responses is a characteristic feeling, *which is the emotion.* Thus the one object in our environment may provoke both the instinctive act and the emotion, since these are but the two sides of the one situation. For example, when we are sitting quietly in our room there comes unexpectedly a terrific crash of thunder. Instinctively we start, the heart stops, the breathing is interrupted, the face blanches, and we are all in a tremble: these are the characteristic physical responses to this particular stimulus. At the same time a feeling of fear surges over us: this is the characteristic emotional accompaniment of the starting, the interrupted heart beat, the decreased arterial pressure, and the trembling. If these physical responses do not occur on hearing the thunder crash, the emotion of fear is absent; if the emotion of fear is lacking, it is evidence that these expressions have not occurred.

Definition: Feeling and emotion.

We may look upon emotion, then, as *a feeling state of a high degree of intensity accompanying a complex physical response to some stimulus.* The distinction

between emotion and feeling is a purely arbitrary one, since the difference is only one of complexity and degree, and many feelings may rise to the intensity of emotions. A feeling of sadness on hearing of a number of fatalities in a railway accident may suddenly become an emotion of grief if we learn that a member of our family is among those killed. A feeling of gladness may develop into an emotion of joy, or a feeling of resentment be kindled into an emotion of rage.

Emotion and the physical response.

The order of the entire event resulting in an emotion is, (1) some *object of consciousness*, coming either from immediate perception or through memory or imagination, of such a nature that (2) characteristic *physical responses* are set up, deep-seated enough to affect the entire organism; and (3) *the feeling state* which accompanies these physical changes and which we call the *emotion*. It is readily observed that nothing new to us has been introduced in this description. We have already seen that all consciousness is motor, which is but another way of saying that every sensory current of the cortex must find an outlet through motor channels. Sometimes the motor discharge is of such a nature that we can easily discover its direction, as when the subject frowns, strikes a blow, or runs. At other times responses such as these may not take place, and the motor discharge may register itself chiefly in changes in the breathing, the heart beat, the secretions, or the arterial pressure. We have also seen that some feeling state accompanies all activities of the self. The problem which remains, then, is to discover why certain *particular* physical expressions follow the thunder crash, and why the *particular* feeling quality which we call fear accompanies these expres-

sions; why certain *particular* physical expressions follow a personal insult, and why the *particular* feeling which we call anger goes along with these expressions.

Origin of emotional expressions.

In order to solve this problem we shall have first to go beyond the individual and appeal to the history of the race. What the race has found serviceable, the individual repeats. But even then it is hard to see why the particular type of physical response such as shrinking, pallor, and trembling, which naturally follow stimuli threatening harm, should be the best. It is easy to see, however, that the feeling which prompts to flight or serves to deter from harm's way might be useful. It is plain that there is an advantage in the tense muscle, the set teeth, the held breath, and the quickened pulse which accompany the emotion of anger, and also in the feeling of anger itself, which prompts to the conflict. But even if we are not able in every case to determine at this day why all the instinctive responses and their correlate of feeling were the best for the life of the race, we may be sure that such was the case; for Nature is inexorable in her dictates that only that shall persist which is serviceable in the largest number of cases.

Physiological explanation of emotion.

An interesting question arises at this point as to why we feel emotion accompanying some of our motor responses, and not others. Perceptions are crowding in upon us hour after hour; memory, thought, and imagination are in constant play; and a continuous motor discharge results each moment in physical expressions great or small. Yet, in spite of these facts, feeling which is strong enough to rise to an emotion is only an occasional thing. If emotion accompanies any form of physical expression, why not all? Let us see whether we can discover any reason. One day

I saw a boy leading a dog along the street. All at once the dog slipped the string from over his head and ran away. The boy stood looking after the dog for a moment, and then burst into a fit of rage. What all had happened? The moment before the dog broke away everything was running smoothly in the experience of the boy. There was no obstruction to his thought or his plans. Then in an instant the situation changes. The smooth flow of experience is checked and baffled. The discharge of nerve currents which meant thought, plans, action, is blocked. A crisis has arisen which requires readjustment. The nerve currents must flow in new directions, giving new thought, new plans, new activities—the dog must be recaptured. It is in connection with this *damming up of nerve currents from following their wonted channels* that the emotion emerges. Or, putting it into mental terms, the emotion occurs *when the ordinary current of our thought is violently disturbed*—when we meet with some crisis which necessitates a readjustment of our thought relations and plans, either temporarily or permanently.

The duration of an emotion.

If the required readjustment is but temporary, then the emotion is short-lived, while if the readjustment is necessarily of longer duration, the emotion also will live longer. The fear which follows the thunder is relatively brief; for the shock is gone in a moment, and our thought is but temporarily disturbed. If the impending danger is one that persists, however, as of some secret assassin threatening our life, the fear also will persist. The grief of a child over the loss of some one dear to him is comparatively short, because the current of the child's life has not been so closely bound up in a complexity of experi-

ences with the lost object as in the case of an older person, and hence the readjustment is easier. The grief of an adult over the loss of a very dear friend lasts long, for the object grieved over has so become a part of the bereaved one's experience that the loss requires a very complete readjustment of the whole life. In either case, however, as this readjustment is accomplished the emotion gradually fades away.

Emotions occur in connection with crises in experience.

If our description of the feelings has been correct, it will be seen that the simpler and milder feelings are for the common run of our everyday experience; they are the common valuer of our thoughts and acts from hour to hour. The emotions, or more intense feeling states, are, however, the occasional high tide of feeling which occurs in crises or emergencies. We are angry on some *particular* provocation, we fear some *extraordinary* factor in our environment, we are joyful over some *unusual* good fortune.

The control of emotions.

Since all emotions rest upon some form of physical expression primarily, and upon some thought back of this secondarily, it follows that the first step in controlling an emotion is to secure the removal of the state of consciousness which serves as its basis. This may be done, for instance, with a child either by banishing the terrifying dog from his presence, or by convincing him that the dog is harmless. The motor response will then cease, and the emotion pass away. If the thought is persistent, however, through the persistence of its stimulus, then what remains is to seek to control the physical expression, and in that way suppress the emotion. If, instead of the knit brow, the tense muscles, the quickened heart beat, and all the deeper organic changes which go along with these, we can keep a smile on the face, the muscles re-

laxed, the heart-beat steady, and a normal condition in all the other organs, we shall have no cause to fear an explosion of anger. If we are afraid of mice and feel an almost irresistible tendency to mount a chair every time we see a mouse, we can do wonders in suppressing the fear by resolutely refusing to give expression to these tendencies. *Inhibition of the expression inevitably means the death of the emotion.*

Dependence on expression.

This fact has its bad side as well as its good in the feeling life, for it means that good emotions as well as bad will fade out if we fail to allow them expression. We are all perfectly familiar with the fact in our own experience that an interest which does not find means of expression soon passes away. Sympathy unexpressed ere long passes over into indifference. Even love cannot live without expression. Religious emotion which does not go out in deeds of service cannot persist. The natural end and aim of our emotions is to serve as motives to activity; and missing this opportunity, they have not only failed in their office, but will themselves die of inaction.

Relief through expression.

But, while emotion may be inhibited by suppressing the physical expressions on which it is founded, so may a state of emotional tension be relieved by some forms of expression. None have failed to experience the relief which comes to the overcharged nervous system from a good cry. There is no sorrow so bitter as a dry sorrow, when one cannot weep. A state of anger or annoyance is relieved by an explosion of some kind, either in a blow or its equivalent in speech. We often feel better when we have told a man "what we think of him."

At first glance this all seems opposed to what we have been laying down as the explanation of emo-

The physiological explanation.

tion. Yet it is not so if we look well into the case. We have already seen that emotion occurs when there is a blocking of the usual pathways of discharge for the nerve currents, which must then seek new outlets, and thus result in the setting up of new motor responses. In the case of grief, for example, there is a disturbance in the whole organism; the heart beat is deranged, the blood pressure diminished, and the nerve tone lowered. What is needed is for the currents which are finding an outlet in directions resulting in these particular responses to find a pathway of discharge which will not produce such deep-seated results. This may be found in crying. The energy thus expended is diverted from producing internal disturbances. Likewise, the explosion in anger may serve to restore the equilibrium of disturbed nerve currents.

Relief does not follow if image is held before the mind.

All this is true, however, only when the expression does not serve to keep the idea before the mind which was originally responsible for the emotion. A person may work himself into a passion of anger by beginning to talk about an insult and, as he grows increasingly violent, bringing the situation more and more sharply into his consciousness. The effect of terrifying images is easily to be observed in the case of one's starting to run when he is afraid after night. There is probably no doubt that the running would relieve his fear providing he could do it and not picture the threatening something as pursuing him. But, with his imagination conjuring up dire images of frightful catastrophes at every step, all control is lost and fresh waves of terror surge over the shrinking soul.

Among civilized peoples there is a constantly growing tendency toward emotional control. Primitive

races express grief, joy, fear, or anger much more freely than do civilized races. This does not mean that primitive man feels more deeply than civilized man; for, as we have already seen, the crying, laughing, or blustering is but a small part of the whole physical expression, and one's entire organism may be stirred to its depths without any of these outward manifestations. Man has found it advisable as he advanced in civilization not to reveal all he feels to those around him. The face, which is the most expressive part of the body, has come to be under such perfect control that it is hard to read through it the emotional state, although the face of civilized man is capable of expressing far more than is that of the savage. The same difference is observable between the child and the adult. The child reveals each passing shade of emotion through his expression, while the adult may feel much that he does not show.

Growing tendency toward emotional control.

The problem for each individual in this connection is to secure a proper balance between emotional expression and control. Nothing affects the type of one's personality more than the quality of his emotional life. No one likes the hard and cold person who lives in the realm of intellect alone, or who, feeling deeply in his own soul, seeks to hide all his emotion under a passive exterior. The atmosphere about such a one lacks the human quality—he is too frigid. On the other hand, we like no better the person who is too ready to reveal his emotions. Tears too freely shed suffer in quality and no longer command our sympathy. We feel that an emotion which is ever ready to bubble over must lie near the surface, else it would not so readily appear. Thus may any emotion be cheapened by overexpression.

A desirable emotional balance.

The emotions and enjoyment.

There is no other mental factor which has more to do with the enjoyment we get out of life than our feelings and emotions. Few of us would care to live at all, if all feeling were eliminated from human experience. True, feeling often makes us suffer; but in so far as life's joys triumph over its woes, our feelings minister to our enjoyment. Without sympathy, love, and appreciation, life would be barren indeed. Moreover, it is only through our own emotional experience that we are able to interpret the feeling side of the lives about us. Failing in this, we miss one of the most significant phases of social experience, and are left with our own sympathies undeveloped and our life by so much impoverished.

The interpretation of the subtler emotions of those about us is in no small degree an art. The human face and form present a constantly changing panorama of the soul's feeling states to those who can read their signs. The ability to read the finer feelings, which reveal themselves in expressions too delicate to be read by the eye of the gross or unsympathetic observer, lies at the basis of all fine interpretation of personality. Feelings are often too deep for outward expression, and we are slow to reveal our deepest selves to those who cannot appreciate and understand them.

Cultivation of the emotions.

The emotions are to be cultivated as the intellect or the muscles are to be cultivated; namely, through proper exercise. Our thought is to dwell on those things to which proper emotions attach, and to shun lines which would suggest emotions of an undesirable type. Emotions which are to be developed must, as has already been said, find expression; we must act in response to their leadings, else they become but

idle vaporings. If love prompts us to say a kind word to a suffering fellow mortal, the word must be spoken or the feeling itself fades away. On the other hand, the emotions which we wish to suppress are to be refused expression. The unkind and cutting word is to be left unsaid when we are angry, and the fear of things which are harmless left unexpressed and thereby doomed to die.

The emotional factor in our environment.

Much material for the cultivation of our emotions lies in the everyday life all about us if we can but interpret it. Few indeed of those whom we meet daily but are hungering for appreciation and sympathy. Lovable traits exist in every character, and will reveal themselves to the one who looks for them. Miscarriages of justice abound on all sides and demand our indignation and wrath, and the effort to right the wrong. Evil always exists to be hated and suppressed, and dangers to be feared and avoided. Human life and the movement of human affairs constantly appeal to the feeling side of our nature if we understand at all what life and action mean. A certain blindness exists in many people, however, which makes our own little joys, or sorrows, or fears the most remarkable ones in the world, and keeps us from realizing that others may feel as deeply as we. Of course this self-centered attitude of mind is fatal to any true cultivation of the emotions. It leads to an emotional life which lacks not only breadth and depth, but also perspective.

Literature and the cultivation of the emotions.

In order to increase our facility in this interpretation of the emotions by teaching us what to look for in life and experience, we may go to literature. Here we find life interpreted for us in the ideal by masters of interpretation; and, looking through their eyes, we

see new depths and breadths of feeling which we had never before discovered. Indeed, literature deals far more in the aggregate with the feeling side than with any other aspect of human life. And it is just this which makes literature a universal language, for the language of our emotions is more easily interpreted than that of our reason. The smile, the cry, the laugh, the frown, the caress are understood all around the world among all peoples. They are universal.

A danger.

There is always this danger to be avoided, however. We may become so taken up with the overwrought descriptions of the emotions as found in literature or on the stage that the common humdrum of everyday life around us seems flat and stale. The interpretation of the writer or the actor is far beyond what we are able to make for ourselves, so we take their interpretation rather than trouble ourselves to look in our own environment for the material which might appeal to our emotions. It is not rare to find those who easily weep over the woes of an imaginary person in a book or on the stage unable to feel sympathy for the real suffering which may exist all around them. The story is told of a lady at the theater who wept over the suffering of the hero in the play; and at the moment she was shedding the unnecessary tears, her own coachman, whom she had compelled to wait for her in the street, was frozen to death. Our seemingly prosaic environment is full of suggestions to the emotional life, and books and plays should only help to develop in us the power rightly to respond to these suggestions.

Harm in emotional overexcitement.

Danger may exist also in still another line; namely, that of emotional overexcitement. There is a great nervous strain in high emotional tension. Nothing

is more exhausting than a severe fit of anger; it leaves its victim weak and limp. A severe case of fright often incapacitates one for mental or physical labor for hours, or it may even result in permanent injury. The whole nervous tone is distinctly lowered by sorrow, and even excessive joy may be harmful.

In our actual, everyday life, there is little danger from emotional overexcitement unless it be in the case of fear in children, as was shown in the discussion on instincts, and in that of grief over the loss of objects that are dear to us. Most of our childish fears we could just as well avoid if our elders were wiser in the matter of guarding us against those that are unnecessary. The griefs we cannot hope to escape, although we can do much to control them. Long-continued emotional excitement, unless it is followed by corresponding activity, gives us those who weep over the wrongs of humanity, but never do anything to right them; who are sorry to the point of death over human suffering, but cannot be induced to lend their aid to its alleviation. We could very well spare a thousand of those in the world who merely *feel*, for one who *acts*.

We should watch, then, that our good feelings do not simply evaporate as feelings, but that they find some place to apply themselves to accomplish good; that we do not, like Hamlet, rave over wrongs which need to be righted, but never bring ourselves to the point where we take a hand in their righting. If our emotional life is to be rich and deep in its feeling and effective in its results on our acts and character, it must find its outlet in deeds.

Emotions are among our strongest motives to action. Love has often done in the reformation of a fallen life

Emotions as motives.

what strength of will was not able to accomplish; it has caused dynasties to fall, and has changed the map of nations. Hatred is a motive hardly less strong. Fear will make savage beasts out of men who fall under its sway, causing them to trample helpless women and children under feet, whom in their saner moments they would protect with their lives. Anger puts out all the light of reason, and prompts peaceful and well-meaning men to commit murderous acts. Thus feeling, from the faintest and simplest feeling of interest, the ranges of pleasures and pain, the sentiments which underlie all our lives, on to the mighty emotions which grip our lives with an overpowering strength—these constitute a large part of the motive power which is constantly urging us on to do and dare. Hence it is important from this standpoint, also, that we should have the right type of feelings and emotions well developed, and the undesirable ones eliminated as far as possible.

Emotional habits.

Emotion and feeling are partly habit. That is, we can form emotional as well as other habits, and they are as hard to break. Anger allowed to run uncontrolled leads into habits of angry outbursts, while the one who habitually controls his temper finds it submitting to the habit of remaining within bounds. One may cultivate the habit of showing his fear on all occasions, or of discouraging its expression. He may form the habit of jealousy or of confidence. It is possible even to form the habit of falling in love, or of so suppressing the tender emotions that love finds little opportunity for expression. And here, as elsewhere, habits are formed through performing the acts upon which the habit rests. If there are emotional habits we are desirous of forming, what we have to do is to

indulge the emotional expression of the type we desire, and the habit will follow. If we wish to form the habit of living in a chronic state of the blues, then all we have to do is to be blue and act blue sufficiently, and this form of emotional expression will become a part of us. If we desire to form the habit of living in a happy, cheerful state, we can accomplish this by encouraging the corresponding expressions.

EXERCISES

What are the characteristic bodily expressions which accompany a feeling of anger? of fear? of hatred? of love?

Which of these forms of expression may be easily detected by an observer? Are those which cannot be detected any less real than the grosser forms of expressions?

What is the philosophy in "counting ten" before you strike when you are angry?

Are you naturally emotional? To what emotions are you the most subject?

Are you inclined to any form of emotional expression which you are trying to suppress? Do you lack in some form of emotional expression which you should cultivate?

Are you naturally responsive to the emotional tone of others; that is, are you sympathetic?

Are you easily affected by reading emotional books?

What are you doing to enrich your emotional life?

SUGGESTED READINGS

James, "Psychology," Briefer Course, Chapter XXIV.
James, "Principles of Psychology," Chapter XXV.
Ribot, "Psychology of the Emotions," Chapters VII–IX.
Angell, "Psychology," Chapters XVIII and XIX.
Royce, "Outlines of Psychology," Chapter XIV.

CHAPTER XV

THE WILL

Mind secures adaptation to environment.

THE fundamental fact in all life is *movement, activity.* Starting with the lower forms of animals and passing up through the higher, we find a constantly growing range of movements and activities progressing side by side with an increasing complexity of mental life. This correspondence is not mere accident. A wide and varied range of activities is possible only when directed by a complex consciousness, and a highly developed consciousness never accompanies a narrow and simple range of activities. The tiny animal drifting hither and thither in the tide lives a very simple and stupid mental life, not just because he was created thus, but because he has no need of a higher complex consciousness when he has no activities to perform which require direction. Indeed, a highly developed mind would not only be unnecessary for such an animal, but would be a positive detriment; for a complex consciousness has no significance except as it renders possible a greater sphere of activity. Man has a complex and highly developed mind because he has need of it to adjust himself to the great complexity of activities which he must perform. All consciousness is motor. Thought and feeling from their very nature result in action. They have developed to their present stage in the human family, not merely along with growing activities, but because of them.

Volition concerns itself wholly with acts. The will always has to do with causing or inhibiting some action either physical or mental. Here its function begins and ends. Movements, like other phenomena, do not just happen. They never occur without a cause back of them. Whether they are performed with a conscious end in view or without it, the fact remains the same—*something* must lie back of the act to account for its performance. During the last hour, each of us has performed many simple movements and more or less complex acts. These acts have varied greatly in character. Of many we were wholly unconscious. Others were consciously performed, but practically without effort on our part. Still others were accomplished only after a struggle to decide which of two lines of action we should take. What is it that lies back of each of these classes of acts? Is the cause the same in all cases, or does it vary as the type of action varies? In order to answer these questions let us look a little more closely into the character of the most important types of action.

Will concerns itself with adaptive acts.

First, there are going on within every living organism countless movements of which he is in large part unconscious, which he does nothing to initiate, and which he is largely powerless to prevent. Some of them are wholly, and others almost, out of the reach and power of his will. Such are the movements of the heart and vascular system, the action of the lungs in breathing, the movements of the digestive tract, the work of the various glands in their process of secretion. We may even go to the very cells themselves and find that here also ceaseless activity is the rule wherever the process of metabolism is going on. The entire organism is not only a mass of living matter,

Simple reflex acts.

but just because it is living no part of it is at rest. Movements of this type require no external stimulus and no direction. They take care of themselves, as long as the body is in health, without let or hindrance, continuing whether we sleep or wake, whether we are in hypnotic trance or in anæsthetic coma. With movements of this type we shall have no more concern, since they are almost wholly physiological, and come scarcely at all within the range of the consciousness.

Instinctive acts.

Next, there are a large number of such acts as closing the eyes when they are threatened, starting back from danger, crying out from pain or alarm, frowning and striking when angry. These may roughly be classed as instinctive, and have already been discussed under that head. They differ from the former class in that they require some stimulus to set the act off. We are fully conscious of their performance, although they are performed without a conscious end in view. Winking the eye serves an important purpose, but that is not why we wink; starting back from danger is a wise thing to do, but we do not stop to consider this before performing the act. And so on with a multitude of reflex and instinctive acts. They are performed immediately upon receiving an appropriate stimulus, because we possess an organism calculated to act in a definite way in response to certain stimuli. There is no need for, and indeed no place for, anything to come in between the stimulus and the act. The stimulus pulls the trigger of a ready-set nervous system, and the act follows at once. Acts of these reflex and instinctive types do not come properly within the range of volition, hence we will not consider them further.

Finally, growing out of these reflex and instinctive

Volitional acts preceded by nonvolitional.

acts is a broad field of action which is called *volitional. The distinguishing feature of this type of action is that the acts are performed with a definite end in view.* This end is something which we *desire* and which we purpose to attain through the proposed act. In order to attain a desired end it is evident that we must be able to purpose an act suitable for the accomplishment of that end. But it is impossible to purpose an act, the copy or image of which is not in the memory; for there would be nothing present to purpose. Now it happens that all random, reflex, and instinctive acts once or many times involuntarily performed leave their image in the mind; and these *images serve as ends* which we can deliberately will to attain. From this it follows that the scope of our possible voluntary acts depends on the supply of images left by experiences of acts first voluntarily performed.

Ideomotor action.

Many of our acts follow immediately the appearance of the image in consciousness, without hesitation and without delay. This kind of action we name *ideomotor.* The pencil and paper are lying before us, and we find ourselves scribbling; these familiar articles have suggested the image of writing, and the act has supervened almost without our consciousness of it. A door starts to blow shut, and we spring up and avert the slam; the image of the act necessary to prevent the accident has entered the mind and been acted upon at once. The memory of a neglected errand comes to us, and we have started on its performance before we are aware; the act has followed immediately on the heels of the image. The movements of the piano player's fingers follow unerringly and with almost incredible speed his perception of

the symbols on the printed page; each separate percept has remained but the fraction of a second in consciousness, but yet long enough for the movement to follow. A crowd watching a football game may be observed to lean forward with tense muscles in the direction their favorite team is advancing. The gesticulations of a forcible speaker are often performed in miniature by interested listeners. The thought of climbing the stairs is followed by a feeling of innervation in the muscles of the legs. The lips have a tendency to pronounce the words as we read silently from a printed page. And so we might go on and give a thousand similar illustrations.

The image and the act.

We may then lay it down as a rule *that every image of a movement tends to result in the actual movement, and will so result unless checked by an antagonistic image.* In the run of our everyday experience there is a constant interplay of images, some leading toward motor responses, and others restraining from them. The child sees the lamp and starts to reach for it, when the memory of yesterday's burn from a like act comes in and interferes; the inhibiting image is strong enough in this case to prevent the act. An aching tooth suggests that we go to the dentist and have it extracted, but the thought of the pain occurs to us and we delay the ordeal. Finally, the pain may become so severe that the immediate torture overbalances the thought of the more distant suffering, and we find ourselves on the way to the dentist.

Motor power of an image.

A waking man's behavior is at all times " the resultant of two opposing neural forces. With unimaginable fineness some currents among the cells and fibers of his brain are playing on the motor nerves, while other currents, as unimaginably fine, are play-

ing on the first currents, damming or helping them, altering their direction or their speed." No matter how long or how severe may be the struggle between the conflicting images, however, the act comes in the end as a result of the image which has triumphed, and hence occupies the attention. And, further, when attention has once settled down on the proper image, the act is sure to follow.

Indecision a conflict of images.

As long as these contending neural forces are balanced against each other, as long as the images are in conflict to win the attention, we are in a state of *indecision.* This happens whenever the mind is occupied by a number of antagonistic images. Everyone knows for himself this state of inward unrest. An image enters the mind which would of itself prompt an act; but before the act can occur, a contrary image appears and the act is checked; another image comes favoring the act, and is in turn counterbalanced by an opposing one. The impelling and inhibiting images we call *motives* or *reasons* for and against the proposed act. While we are balancing the motives against each other, we are said to *deliberate.* This process of deliberation must go on, if we continue to think about the matter at all, until one set of images has triumphed over the other and secured the attention. When this has occurred, we have *decided,* and the deliberation is at an end. We have exercised the highest function of the will and made a *choice.*

Decision may be immediate or delayed.

Sometimes the battle of motives is short, the decision being reached as soon as there is time to summon all the reasons on both sides of the question. At other times the conflict may go on for days or weeks, neither set of motives being strong enough to vanquish the other and dictate the decision. When the

motives are somewhat evenly balanced we wisely pause in making a decision, because when one line of action is taken, the other cannot be, and we hesitate to lose either opportunity. A state of indecision is usually highly unpleasant, and no doubt more than one decision has been hastened in our lives simply that we might be done with the unpleasantness attendant on the consideration of two contrary and insistent sets of motives.

The emotional factor in decision.

It is of the highest importance when making a decision of any consequence that we should be fair in considering all the reasons on both sides of the question, allowing each its just weight. Nor is this as easy as it might appear; for, as we saw in our study of the emotions, our feeling attitude toward any object that occupies the mind is largely responsible for the subjective value we place upon it. It is easy to be so prejudiced toward or against a line of action that the motives bearing upon it cannot get fair consideration. To be able to eliminate this personal factor to such an extent that the evidence before us on a question may be considered on its merits is a rare accomplishment.

Types of decision.

A decision may be reached in a variety of ways, the most important ones of which may now briefly be described after the general plan suggested by Professor James:

The reasonable type.

(1) One of the simplest types of decision is that in which the preponderance of motives is clearly seen to be on one side or other, and the only rational thing to do is to decide in accordance with the weight of evidence. If we discover ten reasons why we should pursue a certain course of action, and only one or two reasons of equal weight why we should not, then

the decision ought not to be hard to make. The points to watch in this case are (*a*) that we have really discovered all the important reasons on both sides of the case, and (*b*) that our feelings of personal interest or prejudice have not given some of the motives an undue weight in our scale of values. Decisions of this type are called *reasonable.*

Accidental type: external motives.

(2) It is to be doubted whether as many of our decisions are made under immediate stress of volition as we think. We may be hesitating between two sets of motives, unable to decide between them, when a third factor enters which is not really related to the question at all, but which finally dictates the decision nevertheless. For example, we are considering the question whether we shall go on an excursion or stay at home and complete a piece of work. The benefits coming from the recreation, and the pleasures of the trip are pitted against the expense which must be incurred and the desirability of having the work done on time. At this point, while as yet we have been unable to decide, a friend comes along, and we seek to evade the responsibility of making our own decision by appealing to him, "You tell me what to do!" How few of us have never said in effect if not in words, "I will do this or that if you will"? How few have never taken advantage of a rainy day to stay from church or shirk an undesirable engagement? How few have not allowed important questions to be decided by some trivial or accidental factor not really related to the choice in the least?

Drifting with circumstances.

This form of decision is *accidental* decision. It does not rest on motives which are vitally related to the case, but rather on the accident of external circumstances. The person who habitually makes his deci-

sions in this way lacks power of will. He does not hold himself to the question until he has the evidence before him, and then himself direct his attention to the best line of action and so secure its performance. He drifts with the tide, he goes with the crowd, he shirks responsibility.

Accidental type: subjective motives

(3) A second type of *accidental* decision may occur when we are hesitating between two lines of action which are seemingly about equally desirable, and no preponderating motive enters the field; when no external factor appears, and no advising friend comes to the rescue. Then, with the necessity for deciding thrust upon us, we tire of the worry and strain of deliberation and say to ourselves, "This thing must be settled one way or the other pretty soon; I am tired of the whole matter." When we have reached this point we are likely to shut our eyes to the evidence in the case, and decide largely upon the whim or mood of the moment. Very likely we regret our decision the next instant, but without any more cause for the regret than we had for the decision. It is evident that such a decision as this does not rest on valid motives, but rather on the accident of subjective conditions. Habitual decisions of this type are an evidence of a mental laziness or a mental incompetence which renders the individual incapable of marshaling the facts bearing on a case. He cannot hold them before his mind and weigh them against each other until one side outweighs the other and dictates the decision. Of course the remedy for this weakness of decision lies in not allowing oneself to be pushed into a decision simply to escape the unpleasantness of a state of indecision, or the necessity of searching for further evidence which will make the decision easier.

Chronic indecision.

On the other hand, it is possible to form a habit of *indecision*, of undue hesitancy in coming to conclusions when the evidence is all before us. This gives us the mental dawdler, the person who will spend several minutes in an agony of indecision over whether to carry an umbrella on this particular trip; whether to wear black shoes or tan shoes to-day; whether to go calling or to stay at home and write letters this afternoon. Such a person is usually in a stew over some inconsequential matter, and consumes so much time and energy in fussing over trivial things that he is incapable of handling larger ones. If we are certain that we have all the facts in a given case before us, and have given each its due weight so far as our judgment will enable us to do, then there is nothing to be gained by delaying the decision. Nor is there any occasion to change the decision after it has once been made unless new evidence is discovered bearing on the case.

Decision under effort.

(4) The highest type of decision is that in which the *I* is the determining factor. The pressure of external circumstances and inward impulse is not enough to overcome a calm and determined I WILL. Two possible lines of action may lie open before us. Every current of our being leads toward the one; in addition, inclination, friends, honors all beckon in the same direction. From the other course our very nature shrinks; duty alone bids us take this line, and promises no rewards except the approval of conscience. Here is the crucial point in human experience; the supreme test of the individual; the last measure of man's independence and power. Winning at this point man has exercised his highest prerogative—that of independent choice; failing here, he reverts toward the lower forms

This the test of power.

and is a creature of circumstance, no longer the master of his own destiny, but blown about by the winds of chance. And it behooves us to win in this battle. We may lose in a contest or a game and yet not fail, because we have done our best; if we fail in the conflict of motives we have planted a seed of weakness from which we shall at last harvest defeat.

Illustration from Hugo.

Jean Val Jean, the galley slave of almost a score of years, escapes and lives an honest life. He wins the respect and admiration of friends; he is elected mayor of his town, and honors are heaped on him. At the height of his prosperity he reads one day that a man has been arrested in another town for the escaped convict Jean Val Jean, and is about to be sent to the galleys. Now comes the supreme test in Jean Val Jean's life. Shall he remain the honored, respected citizen and let an innocent man suffer in his stead, or shall he proclaim himself the long-sought criminal and again have the collar riveted on his neck and take his place at the oars? He spends one awful night of conflict, in which contending motives make a battle ground of his soul. But in the morning he has won. He has saved his manhood. His conscience yet lives—and he goes and gives himself up to the officers. Nor could he do otherwise and still remain a *man.*

Will acts through directing the attention.

The ultimate test of the strength of the will is found in the power of attention; upon this all choice finally rests. Given the ability to attend to one set of motives to the exclusion of all others, and the decision is already made. *For decision finally consists in mentally agreeing to attend to the images suggesting the accepted line of action and shutting from the mind those opposed to it.* Once the decision is made, the act which is to carry it out may either follow

immediately or be delayed for a more appropriate opportunity. This does not matter. When the act comes, whether sooner or later, it is but the expression of the images which occupied the attention in the decision.

Objective tests not safe measure of volition.

The actual amount of volition exercised in making a decision cannot be measured by objective results. The fact that *A* follows the pathway of duty, while *B* falters and finally drifts into the byways of pleasure, is not certain evidence that the former has put forth the greater power of will. In the first place, the allurements which led *B* astray may have had no charms for *A*. Furthermore, *A* may have so formed the habit of pursuing the pathway of duty when the two paths opened before him, that his well-trained feet unerringly led him into the narrow way without a struggle. Of course *A* is on safer ground than *B*, and on ground that we should all seek to attain. But, nevertheless, *B*, although he fell when he should have stood, may have been fighting a battle and manifesting a power of resistance of which *A*, under similar temptation, would have been incapable. The only point from which a conflict of motives can be safely judged is that of the soul which is engaged in the battle.

Volitional types: 1. The impulsive type.

Several fairly well-marked volitional types may be discovered: (1) The *impulsive* type of will, which goes along with a nervous organism of the hair-trigger kind. The brain is in a state of highly unstable equilibrium, and a relatively slight current serves to set off the motor centers. Action follows before there is time for a counteracting current to intervene. Putting it in mental terms, we act on an idea which presents itself before an opposing one has opportunity

to enter the mind. Hence *the action is largely or wholly ideomotor and but slightly or not at all deliberative.* It is this type of will which results in the hasty word or deed, or the rash act committed on the impulse of the moment and repented of at leisure; which compels the frequent, "I didn't think, or I would not have done it!" The impulsive person may undoubtedly have credited up to him many kind words and noble deeds. In addition, he usually carries with him an air of spontaneity and whole-heartedness which go far to atone for his faults. The fact remains, however, that he is too little the master of his acts, that he is guided too largely by external circumstances or inward caprice. He lacks balance.

This not to be confused with quick decision.

Impulsive action is not to be confused with quick decision and rapid action. Many of the world's greatest and safest leaders have been noted for quickness of decision and for rapidity of action in carrying out their decisions. It must be remembered, however, that these men were making decisions in fields well known to them. They were specialists in this line of deliberation. The motives for and against certain lines of action had often been dwelt upon. All possible contingencies had been imaged many times over, and a valuation placed upon the different motives. The various images had long been associated with certain definite lines of action. Deliberation under such conditions can be carried on with lightning rapidity, each motive being checked off as worth so much the instant it presents itself, and action can follow immediately when attention settles on the proper motive to govern the decision. This is not impulse, but abbreviated deliberation. These facts suggest to us that we should think much and carefully

over matters in which we are required to make quick decisions.

The remedy for impulsive decision.

Of course the remedy for the overimpulsive type is to change ideomotor into deliberative action. When the impulse comes to act without consideration, pause to give the other side of the question an opportunity to be heard. Check the motor response to images which suggest action until you have reviewed the field to see whether there are contrary images to be taken into account. Form the habit of waiting for all evidence before deciding. "Think twice" before you act.

2. The obstructed will.

(2) The opposite of the impulsive type of will is the *obstructed* or *balky* will. In this type there is too much inhibition, or else not enough impulsion. Images which should result in action are checkmated by opposing images, or do not possess vitality enough as motives to overcome the dead weight of inertia which clogs mental action. The person knows well enough what he should do, but he cannot get started. He "cannot get the consent of his will." It may be the student whose mind is tormented by thoughts of coming failure in recitation or examination, but who yet cannot force himself to the exertion necessary safely to meet the ordeal. It may be the dissolute man who tortures himself in his sober moments with remorse and the thought that he was intended for better things, but who, waking from his meditations, goes on in the same old way. It may be the child undergoing punishment, who is to be released from bondage as soon as he will promise to be good, but who cannot bring himself to say the necessary words. It not only may be, but is, man or woman anywhere who has ideals which are known to be worthy and

noble, but which fail to take hold. It is anyone who is following a course of action which he knows is beneath him.

Results from this type.

No one can doubt that the moral tragedies, the failures and the shipwrecks in life come far more from the breaking of the bonds which should bind right ideals to action than from a failure to perceive the truth. Men differ far more in their deeds than in their standards of action.

The remedy for the obstructed will.

The remedy for this diseased type of will is much easier to prescribe than to apply. It is simply to refuse to attend to the contrary images which are blocking action, and to cultivate and encourage those which lead to action of the right kind. It is seeking to vitalize our good impulses and render them effective by acting on them whenever opportunity offers. Nothing can be accomplished by moodily dwelling on the disgrace of harboring the obstructing images. Thus brooding over them only encourages them. What we need is to get entirely away from the line of thought in which we have met our obstruction, and approach the matter from a different direction. The child who is in a fit of the sulks does not so much need a lecture on the disagreeable habit he is forming as to have his thought led into lines not connected with the grievance which is causing him the trouble. The stubborn child does not need to have his will "broken," but rather to have it strengthened. He may be compelled to do what he does not want to do; but if this is accomplished through physical force instead of by leading to thoughts connected with the performance of the act, it may be doubted whether the will has in any degree been strengthened. Indeed it may rather be depended upon that it has

been weakened; for an opportunity for self-control, through which alone the will develops, has been lost. The ultimate remedy for rebellion often lies in greater freedom at the proper time. This does not mean that the child should not obey rightful authority promptly and explicitly, but that just as little external authority as possible should intervene to take from the child the opportunity for *self*-compulsion.

3. The normal will.

(3) The golden mean between these two abnormal types of will may be called the *normal* or *balanced* will. Here there is a proper ratio between impulsion and inhibition. Ideas are not acted upon the instant they enter the mind without giving time for a survey of the field of motives, neither is action "sicklied o'er with the pale cast of thought" to such an extent that it becomes impossible. The evidence is all considered and each motive fully weighed. But this once done, decision follows. No dilatory and obstructive tactics are allowed. The fleeting impulse is not enough to persuade to action, neither is action unduly delayed after the decision is made.

Factors entering into a well-balanced will.

In order to a well-balanced will our mental vision must be clear, the images which constitute the motives must be vivid, and each have its proper valuation. Motives selected as guides to action must be acted upon. Mere resolution is not enough. Deeds must follow.

Training of the will.

The will is to be trained as we train the other powers of the mind—through the exercise of its normal function. The function of the will is to direct or control in the actual affairs of our life. Many well-meaning persons speak of training the will as if we could separate it from the interests and purposes of our daily living, and in some way put it through

its paces merely for the sake of adding to its general strength. This view is all wrong. There is no such thing as *general* power of will. Will is always required in specific acts and emergencies, and it is precisely upon such matters that it must be exercised if it is to be cultivated.

This must be in connection with daily life.

What is needed in developing the will is a deep moral interest in whatever we set out to do, and a high purpose to do it up to the limit of our powers. Without this, any artificial exercises, no matter how carefully they are devised or how heroically they are carried out, cannot but fail to fit us for the real tests of life; with it, artificial exercises are superfluous. It matters not so much what our vocation as how it is performed. The most commonplace human experience is rich in opportunities for the highest form of expression possible to the will—that of directing us into right lines of action, and of holding us to our best in the accomplishment of some dominant purpose.

All have opportunity for training the will.

There is no one set form of exercise which alone will serve to train the will. The student pushing steadily toward his goal in spite of poverty and grinding labor; the teacher who, though unappreciated and poorly paid, yet performs every duty with conscientious thoroughness; the man who stands firm in the face of temptation; the person whom heredity or circumstance has handicapped, but who, nevertheless, courageously fights his battle; the countless men and women everywhere whose names are not known to fame, but who stand in the hard places, bearing the heat and the toil with brave, unflinching hearts—these are the ones who are developing a moral fiber and strength of will which will stand in the day of stress. Better a thousand times such training as this in the

thick of life's real conflicts than any volitional calisthenics or priggish self-denials entered into solely for the training of the will!

Will the highest form of mental life.

We have seen in this discussion that will is a mode of control—control of our thoughts and, through our thoughts, of our actions. Will may be looked upon, then, as the culmination of the mental life, the highest form of directing agent within us. Beginning with the direction of our simplest movements, it goes on until it governs the current of our life in the pursuit of some distant ideal.

Freedom of the will; Limitations.

Just how far the will can go in its control, just how far man is a free moral agent, has long been one of the mooted questions among the philosophers. But some few facts are clear. If the will can exercise full control over all our acts, it by this very fact determines our character; and character spells destiny. There is not the least doubt, however, that the will in thus directing us in the achievement of a destiny works under two limitations: *First*, every individual enters upon life with a large stock of *inherited tendencies*, which go far to shape his interests and aspirations. And these are important factors in the work of volition. *Second*, we all have our setting in the midst of a great *material and social environment*, which is largely beyond our power to modify, and whose influences are constantly playing upon us and molding us according to their type.

These limitations the conditions of freedom.

Yet there is nothing in this thought to discourage us. For these very limitations have in them our hope of a larger freedom. Man's heredity, coming to him through ages of conflict with the forces of nature, with his brother man, and with himself, has deeply instilled in him the spirit of independence and self-

control. It has trained him to deliberate, to choose, to achieve. It has developed in him the power *to will.* Likewise man's environment, in which he must live and work, furnishes the problems which his life work is to solve, and *out of whose solution the will receives its only true development.*

Freedom grows with successful human experience:

It is through the action and interaction of these two factors, then, that man is to work out his destiny. What he *is*, coupled with what he may *do*, leads him to what he may *become.* Every man possesses in some degree a spark of divinity, a sovereign individuality, a power of independent initiative. This is all he needs to make him free—free to do his best in whatever walk of life he finds himself. If he will but do this, the doing of it will lead him into a constantly growing freedom, and he can voice the cry of every earnest heart:

> Build thee more stately mansions, O my soul!
> As the swift seasons roll!
> Leave thy low-vaulted past!
> Let each new temple, nobler than the last,
> Shut thee from heaven with a dome more vast,
> Till thou at length art free,
> Leaving thine outgrown shell by life's unresting sea!

EXERCISES

Give illustrations from your own experience of the various types of actions mentioned in this discussion.

From your own experience of the last hour, what examples of ideomotor action can you give? Would it have been better in some cases had you stopped to deliberate?

Are you easily influenced by prejudice or personal preference in making decisions? What recent decisions have been thus affected?

Can you classify the various ones of your decisions which you can recall under the four types mentioned in the text? Under which class does the largest number fall? Have you a tendency to drift with the crowd? Are you independent in deciding upon and following out a line of action?

What is the value of advice? Ought advice to do more than to assist in getting all the evidence on a case before the one who is to decide?

Can you judge yourself well enough to tell to which volitional type you belong? Are you overimpulsive? Are you stubborn? What is the difference between stubbornness and firmness? Suppose you ask your instructor, or a friend, to assist you in classifying yourself as to volitional type.

Are you troubled with indecision; that is, do you have hard work to decide in trivial matters even after you know all the facts in the case? What is the cause of these states of indecision? the remedy?

Have you a strong power of will? Can you control your attention? Do you submit easily to temptation? Can you hold yourself up to a high degree of effort? Can you persevere?

Have you ever failed in the attainment of some cherished ideal because you could not bring yourself to pay the price in sacrifice or effort necessary?

Are you using the problems and difficulties of your everyday work to grow in strength of will? Have you a purpose which you are bending every effort to accomplish? Are you coming more and more to be the master of yourself?

SUGGESTED READINGS

Dewey, "Psychology," Chapter XXII.
James, "Psychology," Briefer Course, Chapter XXIII.
Royce, "Outlines of Psychology," Chapter XV.
Angell, "Psychology," Chapters XX and XXII.

CHAPTER XVI

SELF-EXPRESSION AND DEVELOPMENT

A brief summary.

We have already seen that the mind and the body are associated in a copartnership in which each is an indispensable and active member. We have seen that the body gets its dignity and worth from its relation with the mind, and that the mind is dependent on the body for the crude material of its thought, and also for the carrying out of its mandates in securing adaptation to our environment. We have seen as a corollary of these facts that the efficiency of both mind and body is conditioned by the manner in which each carries out its share of the mutual activities.

Inter-relation of impression and expression.

No impression without corresponding expression has become a maxim in both physiology and psychology. Inner life implies self-expression in external activities. The stream of impressions pouring in upon us hourly from our environment must have means of expression if development is to follow. We cannot be passive recipients, but must be active participants in the educational process. We must not only be able to *know* and *feel,* but to *do.*

Our many sources of impressions.

The nature of the impressions which come to us and how they all lead on toward ultimate expression is shown in the accompanying diagram (Fig. 19). Our material environment is thrusting impressions upon us every moment of our life; also, the material objects with which we deal have become so saturated with

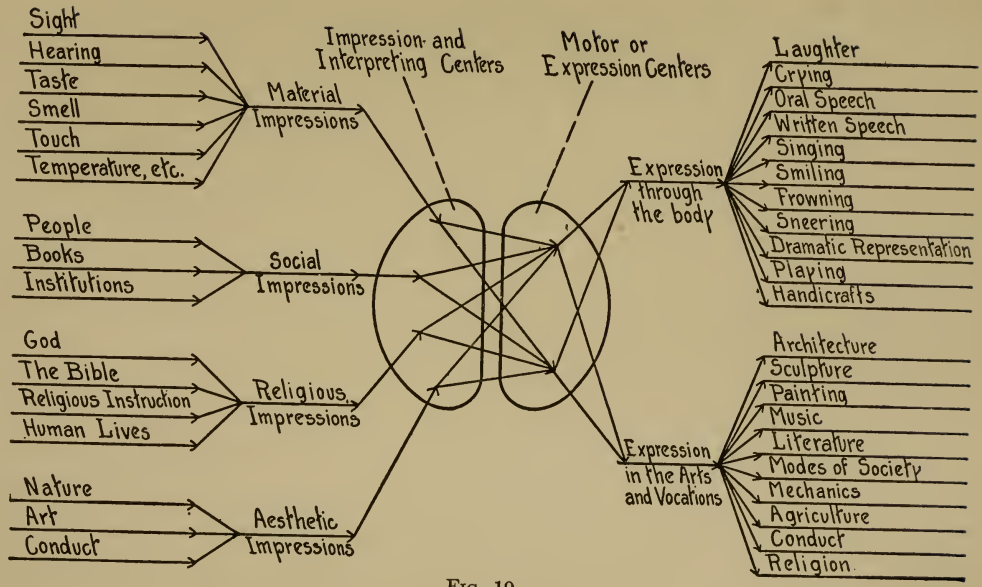
Sight
Hearing
Taste
Smell
Touch
Temperature, etc.
Material Impressions
People
Books
Institutions
Social Impressions
God
The Bible
Religious Instruction
Human Lives
Religious Impressions
Nature
Art
Conduct
Aesthetic Impressions
Impression and Interpreting Centers
Motor or Expression Centers
Expression through the body
Laughter
Crying
Oral Speech
Written Speech
Singing
Smiling
Frowning
Sneering
Dramatic Representation
Playing
Handicrafts
Expression in the Arts and Vocations
Architecture
Sculpture
Painting
Music
Literature
Modes of Society
Mechanics
Agriculture
Conduct
Religion

FIG. 19.

social values that each comes to us with a double significance, and what an object *means* often stands for more than what it *is*. From the lives of people with whom we daily mingle; from the wider circle whose lives do not immediately touch ours, but who are interpreted to us by the press, by history and literature; from the social institutions into which have gone the lives of millions, and of which our lives form a part, there come to us constantly a flood of impressions whose influence cannot be measured. So likewise with religious impressions. God is all about us and within us. He speaks to us from every nook and corner of nature, and communes with us through the still small voice from within, if we will but listen. The Bible, religious instruction, and the lives of good people are other sources of religious impressions constantly tending to mold our lives. The beautiful in nature, art, and human conduct constantly appeals to us in æsthetic impressions.

These all lead toward expression

Each of these groups of impressions may be subdivided and extended into an almost infinite number and variety, the different groups meeting and overlapping, it is true, yet each preserving reasonably distinct characteristics. A common characteristic of them all, as shown in the diagram, is that they all point toward expression. The varieties of light, color, form, and distance which we get through vision are not merely that we may know these phenomena of nature, but that, knowing them, we may use the knowledge in making proper responses to our environment. Our power to know human sympathy and love through our social impressions are not merely that we may feel these emotions, but that, feeling them, we may act in response to them.

Possible forms of expression.

It is impossible to classify logically in any simple scheme all the possible forms of expression. The diagram will serve, however, to call attention to some of the chief modes of bodily expression, and also to the results of the bodily expressions in the arts and vocations. Here again the process of subdivision and extension can be carried out indefinitely. The laugh can be made to tell many different stories. Crying may express bitter sorrow or uncontrollable joy. Vocal speech may be carried on in a thousand tongues. Dramatic action may be made to portray the whole range of human feeling. Plays and games are wide enough in their scope to satisfy the demands of all ages and every people. The handicrafts cover so wide a range that the material progress of civilization can be classed under them, and indeed without their development the arts and vocations would be impossible. Architecture, sculpture, painting, music, and literature have a thousand possibilities both in technique and content. Likewise the modes of society, conduct, and religion are unlimited in their forms of expression.

Limitations of expression: cultivation needed.

While it is more blessed to give than to receive, it is somewhat harder in the doing; for more of the self is, after all, involved in expression than in impression. Expression needs to be cultivated as an art; for who can express all he thinks, or feels, or conceives? Who can do his innermost self justice when he attempts to express it in language, in music, or in marble? The painter answers when praised for his work, "If you could but see the picture I intended to paint!" The pupil says, "I know, but cannot tell." The friend says, "I wish I could tell you how sorry I am." The actor complains, "If I could only portray the passion as I feel it, I could bring all the world to my feet!"

The body, being of grosser structure than the mind, must always lag somewhat behind in expressing the mind's states; yet, so perfect is the harmony between the two, that with a body well trained to respond to the mind's needs, comparatively little of the spiritual need be lost in its expression through the material.

Intellectual value of expression.

Nor are we to think that cultivation of expression results in better power of expression alone, or that lack of cultivation results only in decreased power of expression. There is also a distinct mental value in expression. An idea always assumes new clearness and wider relations when it is expressed. Michael Angelo, making his plans for the great cathedral, found his first concept of the structure expanding and growing more beautiful as he developed his plans. The sculptor, beginning to model the statue after the image which he has in his mind, finds the image growing and becoming more expressive and beautiful as the clay is molded and formed. The writer finds the scope and worth of his book growing as he proceeds with the writing. The student, beginning doubtfully on his construction in geometry, finds the truth growing clearer as he proceeds. The child with a dim and hazy notion of the meaning of the story in history or literature discovers that the meaning grows clear as he himself works out its expression in speech, in the handicrafts, or in dramatic representation. So we may apply the test to any realm of thought whatever, and the law holds good: *It is not in its apprehension but in its expression that a truth finally becomes assimilated to our body of usable knowledge.* And this means that in all training of the body through its motor expression we are to remember that the mind must be behind the act; that the intellect must guide

the hand; that the object is not to make skillful fingers alone, but to develop clear and intelligent thought as well.

Moral value of expression.

Expression also has a distinct moral value. There are many more people of good intentions than of moral character in the world. The rugged proverb tells us that the road to hell is paved with good intentions. And how easy it is to form good resolutions! Who of us has not, after some moral struggle, said, "I will break the bonds of this habit: I will enter upon that heroic line of action!" and then, satisfied for the time with having made the resolution, continued in the old path, until we were surprised later to find that we had never got beyond the resolution? It is not in the moment of the resolve but in the moment when the resolve is carried out in action that the moral value inheres. To take a stand on a question of right and wrong means more than to show one's allegiance to the right—it clears one's own moral vision and gives him command of himself. Expression is, finally, the only true test for our morality. Lacking moral expression, we may stand in the class of those who are merely good, but we can never enter the class of those who are good for something. One cannot but wonder what would happen if all the people in the world who are morally right should give expression to their moral sentiments, not in words alone, but in deeds. Surely the millennium would speedily come, not only among the nations, but in the lives of men.

Religious value of expression.

True religious experience demands expression. The older conception of a religious life was to escape from the world and live a life of communion and contemplation in some secluded spot, ignoring the world thirsting without. Later religious teaching, however,

recognizes the fact that religion cannot consist in drinking in blessings alone, no matter how ecstatic the feeling which may accompany the process; that it is not the receiving, but this along with the giving that enriches the life. To give the cup of cold water, to visit the widow and the fatherless, to comfort and help the needy and forlorn—this is not only scriptural but it is psychological. Only as religious feeling goes out into religious expression, can we have a normal religious experience.

Social value of expression.

The criterion of an education once was, How much does he know? The world did not expect an educated man to *do* anything; he was to be put on a pedestal and admired from a distance. But this criterion is now obsolete. Society cares little how much we know if it does not enable us to do. People no longer merely admire knowledge, but insist that the man of education shall put his shoulder to the wheel and lend a hand wherever help is needed. Education is no longer to set men apart from their fellows, but to make them more efficient comrades and helpers in the world's work. Not the man who *knows* chemistry and botany, but he who can use this knowledge to make two blades of grass grow where but one grew before is the true benefactor of his race. In short, the world demands services returned for opportunities afforded; it expects social expression to result from social impressions.

And this is also best for the individual, for only through social service can we attain to a full realization of the social values in our environment. Only thus can we enter fully into the social heritage of the ages which we receive from books and institutions; only thus can we come into the truest and best rela-

tions with humanity in a common brotherhood; only thus can we live the broader and more significant life, and come to realize the largest possible social self.

The idea of expression in pedagogy.

The educational significance of the truths illustrated in the diagram and the discussion has been somewhat slow in taking hold. This has been due not alone to the slowness of the educational world to grasp a new idea, but also to the practical difficulties connected with adapting the school exercises as well to the expression side of education as to the impression. From the fall of Athens on down to the time of Froebel the schools were constituted on the theory that pupils were to *receive* education, that they were to *drink in* knowledge, that their minds were to be *stored* with facts. Children were to "be seen and not heard." Education was largely a process of gorging the memory with information.

Easier to provide for. The impression side of education.

Now it is evident that it is far easier to provide for this passive side of education than for the active side. All that is needed in the former case is to have teachers and books reasonably full of information, and pupils sufficiently docile to receive it. But in the latter case, the equipment must be more extensive. If the child is to be allowed to carry out his impressions into expressions, if he is actually to *do* something himself, then he must be supplied with adequate equipment.

Handicrafts in the old-time home.

So far as the home life was concerned, the child of several generations ago was at a decided advantage over the child of to-day on the expression side of his education. The homes of that day were beehives of industry, in which a dozen handicrafts were taught and practiced. The buildings, the farm implements, and much of the furniture of the home were made

from the native timber. The material for the clothing of the family was produced on the farm, made into cloth, and finally into garments in the home. Nearly all the supplies for the table came likewise from the farm. These industries demanded the combined efforts of the family, and each child did his or her part.

This lacking in the home of to-day.

But that day is past. One third of our people live in cities, and even in the village and on the farm the handicrafts of the home have been relegated to the factory, and everything comes into the home ready for use. The telephone, the mail carrier, and the deliveryman do all the errands even, and the child in the home is deprived of responsibility and of nearly all opportunity for manual expression. This is no one's fault, for it is just one phase of a great industrial readjustment in society. Yet the fact remains that the home has lost an important element in education, which the school must supply if we are not to be the losers educationally by the change.

The school to take up this line of work.

And modern educational method is insisting precisely on this point. A few years ago the boy caught whittling in school was a fit subject for a flogging; the boy is to-day given bench and tools, and is instructed in their use. Then the child was punished for drawing pictures; now we are using drawing as one of the best modes of expression. Then instruction in singing was intrusted to an occasional evening class, which only the older children could attend, and which was taught by some itinerant singing master; to-day we make music one of our most valuable school exercises. Then all play time was so much time wasted; now we recognize play as a necessary and valuable mode of expression and development. Then dramatic representation was confined to the occasional

exhibition or evening entertainment; now it has become a recognized part of our school work. Then it was a crime for pupils to communicate with each other in school; now a part of the school work is planned so that pupils work in groups, and thus receive social training. Then our schoolrooms were destitute of every vestige of beauty; to-day many of them are artistic and beautiful.

Many schools are yet lacking.

This statement of the case is rather over-optimistic if applied to our whole school system, however. For there are still many schools in which all forms of handicraft are unknown, and in which the only training in artistic expression is that which comes from caricaturing the teacher. Singing is still an unknown art to many teachers. The play instinct is yet looked upon with suspicion and distrust in some quarters. A large number of our schoolrooms are as barren and ugly to-day as ever, and contain an atmosphere as stifling to all forms of natural expression. We can only comfort ourselves with Holmes's maxim, that it matters not so much where we stand as in what direction we are moving. And we certainly are moving toward a larger development and greater efficiency in expression on the part of those who pass through our schools.

Expression and character.

Finally, all that has been said in this discussion has direct reference to what we call character—that mysterious something which we so often hear eulogized and so seldom analyzed. Character has two distinct phases, which may be called the *subjective* phase and the *social* phase; or, stating it differently, character is both what we *are* and what we *do*. The first of these has to do with the nature of the real, innermost self; and the last, with the modes in which

this self finds expression. And it is fair to say that those about us are concerned with what we are chiefly from its relation to what we do.

Character a process.

Character is not a thing, but a process; it is the succession of our thoughts and acts from hour to hour. It is not something which we can hoard and protect and polish unto a more perfect day, but it is the everyday self in the process of living. And the only way in which it can be made or marred is through the nature of this stream of thoughts and acts which constitute the day's life—is through *being* or *doing* well or ill.

Its two lines of development.

The cultivation of character must, then, ignore neither of these two lines. To neglect the first is to forget that it is out of the abundance of the heart that the mouth speaks; that a corrupt tree cannot bring forth good fruit; that the act is the true index of the soul. To omit the second is to leave the character half formed, the will weak, and the life inefficient and barren of results. On the one hand, the mind must be supplied with noble ideas and high ideals, with right emotions and worthy ambitions. On the other hand, the proper connection must be established between these mental states and appropriate acts. And the acts must finally grow into habits, so that we naturally and inevitably translate our ideas and ideals, our emotions and ambitions into deeds. Our character must be strong not in thought and feeling alone, but also in the power to return to the world its finished product in the form of service.

EXERCISES

The list of impressions as given in the diagram may be still further subdivided. Write down a new list, inserting as many subheads as you can think of.

From what sources in nature do you receive the greatest æsthetic enjoyment? in art? What traits in conduct would you describe as *beautiful?* What is a "beautiful life"?

Make a study of the different types of laughter you hear, and seek to determine the mental state which each expresses.

What did a noted sculptor mean when he said that a smile at the eyes cannot be depended upon as can one at the mouth?

Make a list of the most important handicrafts. Have you ever considered the part that the human hand has played in civilization?

What examples have you observed in children's plays showing their love for dramatic representation?

What handicrafts are the most suitable for children of primary grades? for the grammar school? for the high school?

Do you number those among your acquaintance who seem bright enough so far as learning is concerned, but who cannot get anything accomplished? Is the trouble on the expression side of their character?

What about your own powers of expression? Are you seeking to cultivate expression in new lines? Is there danger in attempting too many lines?

SUGGESTED READINGS

Warner, "Physical Expression."

James, "Talks to Teachers," Chapters IV–VII.

Rowe, "The Physical Nature of the Child," Chapter V.

Ham, "Mind and Hand," Chapters I, II, XI, XIII, XIV, and XV.

INDEX

Action, complex, 51.
  Factors involved in, 51.
  Feeling and, 223.
  Ideals and, 140, 141.
  Ideo-motor, 229.
  Image and act, 230.
  Instinctive, 228.
  Reflex, 227.
  Sensory motor, 50.
  Volitional preceded by non-volitional, 229.
Activity, fundamental fact in life, 226.
  In childhood, 209.
  Necessity for motor, 48.
Adolescence, interests of, 210.
Angell, quoted, 155.
Association, devices for, 125.
  Experience unified by, 116.
  How accomplished, 114.
  Is inexorable, 117.
  Laws of, 114, 115.
  Paths of, 50 (Diagram).
Attention, 12–24.
  Activity conditioned by, 21, 22.
  Control of, 21.
  Cultivation of, 18.
  Effects of, 13, 14.
  How we attend, 15 (Fig. 16).
  Habits of, 22.
  Interest and, 19, 22.
  Memory and, 125.
Attention, nature of, 12.
  Types of, 21.

Brain, individual differences in, 110.
  Nutrition and efficiency of, 52.
  Relation to mind, 25, 26.
  Structure of, 32–35.
Bridgman, Laura, cited in illustration, 46.

Cells, function of, 29.
  Structure of, 28.
  Undeveloped, 44.
Cerebellum, 32.
Cerebrum, 32.
Chamberlain, quoted, 174.
Character, development of, 256.
  Expression and, 255.
  Interest and, 207.
  Process, a, 256.
Child, the, at birth, 162.
  Concept-building of, 148.
  Fears of, 176.
  Interests of, 209.
  Percept-building of, 83.
  Plays of, 177.
  Problem which confronts, 82.
  Thinking of, 144, 145.
Choice, how accomplished, 231.
Classification, how accomplished, 147.

Color, how produced, 174.
Concept, the, definition of, 149.
Nature and growth, 148.
Necessity for growth of, 153.
Use in classification, 147.
Use in judgment, 152.
Use in thinking, 149.
Consciousness, complexity of, related to action, 226.
Nature of, 4–10.
Personal character of, 1.
Threefold process, a, 10.
Wave of, the, 6, 7.
Cord, spinal, 30, 31.
Cramming, effects of, 123.
Crises, and emotion, 216.

Decision, definition of, 236.
Emotional factor in, 232.
Immediate or delayed, 231.
Impulsive, 237.
Influenced by mood, 187.
Normal, 241.
Obstructed, 239.
Quick, 238.
Test of the will, 235.
Types of, 232–235.
Under effort, 235.
Deduction, forms of, 156.
Relation to induction, 157.
Deliberation, 231.
Disposition, moods and, 188.
Division of labor, in the cortex, 38–40.
In the nervous system, 37.
Donaldson, quoted, 44.
Dumont, quoted, 59.

Education, environment and, 52.
Expression and, 249–255.
Instinct and, 162, 165.
Education involves both mind and body, 43.
Play and, 179.
Effort, influenced by mood, 187.
Interest and, 206.
Emotion, 212–225.
Control of, 216, 218.
Cultivation of, 220–223.
Definition of, 212.
Dependence on expression, 217.
Enjoyment and, 220.
Feeling and, 213.
Instinct and, 212.
Physical response and, 213.
Physiological explanation of, 214.
Relief through expression of, 217.
Emotional balance, 219.
Factor in decision, 232.
Habits, 224.
Overexcitement, 222.
End organs, function of, 36.
Response to stimuli, 40.
Environment, emotional factor in, 221.
Influence of, 173.
Richness of, 81.
Experience, conditions of thinking, 90.
Crises of, and emotion, 216.
Freedom of will and, 244.
How conserved, 93.
Potentially possible to present, 94.
Present and future interpreted by, 91.
Race experience and instinct, 161, 163.
Related to emotions, 215.
Sentiments grow from, 190.
Unified by association, 116.
Expression, cultivation of, 249.

Expression, dependence of emotion upon, 217.
Emotional, 214, 224.
Emotional relief through, 217.
Impression and, 246, 248.
Limitations of, 249.
Possible forms of, 249.

Fatigue, recuperation from, 53.
Fear, heredity of, 175.
In life of child, 176.
Instinct of, 174.
In the dark, 175.
Of being alone, 176.
Feeling, 182–194.
Action and, 223.
As habit, 224.
Cognition and, 183.
Definition of, 182.
Emotion and, 213.
Importance of, 182.
Mood, or feeling tone, 185.
Qualities of, 184.
Fibers, association possible through, 112, 114.
Development of, 48–50.
Function of, 29.
Kinds of, 35.
Origin of, 28.
Undeveloped, 45.
Freedom and motor development, 48.
Of the will, 243.

Habit, 56–69.
Achievement and, 63.
Attention and, 66.
Danger in, 66.
Economizing effort, 64.
Efficiency and, 64.
Experience conserved by, 93.
Habit, grows out of instincts, 168.
Influence of, 56.
Interest and, 198.
Maxims for forming, 67, 68.
Memory and, 109–113.
Morality and, 66.
Of indecision, 235.
Physical, 57.
Physical basis of, 58.
Habits, emotional, 224.
Mental, 54.
Hearing, tones and noises from, 78.
Heredity, affects mode of imitation, 171.
Fear, 175.
Influence of, 161.
Hugo, illustration from, 236.

Ideals, action and, 140, 141.
Imagination and, 135.
Image and act, 230.
Motor power of an, 230.
Related to emotion, 218.
Imagery, development of, 103–105.
Experience conserved by, 93.
Mental, 90–106.
Types of, 96, 97, 99, 111, 112.
Value of wide range of, 99.
Varying power of, 97, 98.
Images, indecision a conflict of, 231.
In interpreting literature, 100–102.
Introspective test of, 95–97.
Material of imagination, the, 136, 137.
Material of memory, the, 111.
Motor, 102, 229–231.
Reconstruction of, 104.
Viewed by introspection, 95.

Imagination, 128–142.
Constructive power of, 136.
Conduct and, 134.
Emotion and, 218.
Factors in, 137.
Functions of, 129–135.
Ideals and plans through, 135.
In literature and art, 131.
Interpreting others' thought, 129.
Material of, 136.
Practical phases of, 133.
Science and, 130.
Thinking and, 132.
Imitation, conduct and, 171.
Conscious and unconscious, 172.
Individuality in, 171.
Instinct of, 170.
Language and, 171.
Impression, expression and, 246, 248.
Sources of, 246.
Inattention, results of, 18.
Types of, 16, 17.
Induction, deduction and, 159.
Nature of, 157.
Necessity for broad, 157.
"Inductive leap," the, 158.
Instinct, 161–181.
Blindness of unmodified, 164.
Definition of, 162.
Emotion and, 212.
Human, 169.
Individual habit and, 168.
Modified by education, 165.
Of fear, 174–177.
Of imitation, 170–173.
Of play, 177–180.
Racial habits and, 164.
Result of race experience, 161, 163.
Instinctive acts, 228.
Instincts, succession of, 165.
To be utilized, 168.
Transitoriness of, 166.
Useless, 167.
Utilization of, 181.
Interest, 195–211.
Attention and, 19, 22.
Character and, 207.
Direct and indirect, 199.
Dynamic phase of, 117.
Evolution of, 208.
Habit and, 198.
Nature of, 196.
Objective and subjective side of, 197.
Order of development of, 208–210.
Selection among, 203.
Specialization in, 204.
Transitoriness of, 201.
Value of, 202.
Will related to, 207.
Interests, balance among, 205.
Narrow and broad, 204.
Introspection, images known by, 95.
Means of knowing mind, 2.
Test in, 95–97.

James, quoted, 163, 169.
Joints, sensations from, 81.
Judgment, definition of, 150.
In concepts and percepts, 151.
Influenced by feeling, 187.
Leading from particulars to generals, 152.
Remedy for faulty, 153.
Validity of, 152

Knowledge, dependence on experience, 77.
From various senses, 72.

Knowledge, raw material of, 81.
Through judgment, 152.

Laws, of memory, 113, 114.
Light, how produced, 73.
Localization of function, in the cortex, 38, 39.
In the nervous system, 37, 40, 141.

Meaning, dependent on relationship, 143.
Memory, 107–127.
Devices for, 125.
Discriminative, 120.
Factors involved in, 111.
How exercised, 108.
Improvement of, 122, 123.
Laws of, 113, 114.
Materials of, 111, 112.
Physical basis of, 108.
Specialized, 121.
What is a good, 118–120.
What is retained in, 107, 108.
Mind, 1–11.
And brain, 25, 26.
At birth, 27.
Contents of stream of, 8–10.
Dependent on senses, 42.
Known by introspection, 2.
Nature of, 4, 5.
Process, a, 3, 4.
Mood, disposition and, 188.
How determined, 186.
Influence of, 186, 187.
Temperament and, 188.
Mosso, quoted, 161.
Motives, battle of, 231.
Emotions as, 224.
Interest as, 199.
Sentiments as, 192.
Motives, subjective, in decision, 234.
Motor images, 102, 229–231.
Muscle and joint sensations, 81.

Nervous system, central, 30.
Conditions determining efficiency of, 43–54.
Development of, 46.
Division of labor in, 37–41.
Indelibly records acts, 61, 68.
Peripheral, 30, 35, 36.
Relation to stimuli of, 40, 41.
Strain upon, from emotion, 222.
Structure of, 28–36.
Neuron, structure of, 28.
Nutrition, brain efficiency and, 52.
Factors in, 53, 54.

Objects, first-hand contact with, 85.
How defined, 144.
How mind constructs world of, 70, 83–85.
Interdependence of physical and mental, 143.
Qualities of, exist in mind, 73.
Relations existing in, 147.
Old fogies, 154.

Perception, 70–89.
And emotion, 214.
And imagination, 39.
And thought, 87.
Experience and, 85–87.
Of objects, how gained, 83–85.
Of space, 85.
Problem of the, 82.
Personality, influence of, 173.
Play, and initiative, 178.
And work, 177, 179.
In education, 179.

Play, instinct of, 177.
Interest in, 209.
Necessity for, 177.
Points to past and future, 180.
Purpose, factor in imagination, a, 139.

Qualities, objects known through, 76, 83.
Of objects exist in the mind, 73.

Reasoning, definition of, 156.
Forms of, 156–159.
Functions of, 154.
Process of, 155.
Recall, dependence on retention, 109, 111.
How accomplished, 113.
Relationship, among external world of objects, 147.
Discovered through reasoning, 144, 154.
Meaning dependent upon, 143.
Near and remote, 144, 145.
Response, to emotion, 213.
To sensory stimuli, 47, 70.
Retention, and memory, 108, 109.
Dependence on habit, 113.
Difference in retentive power, 110.
More certain than recall, 109.

Self-expression, 246–257.
In play, 177.
Sensation, 70–89.
And feeling, 183.
And perception, 70.
Qualities given by, 76.
Processes of, 73–81.
Simplest form of knowledge, 76.
Sensations, organic, 81.
Senses, aided by reason, 72.
Senses, servants of the mind, 42.
Work of, 26, 27.
Sentiments, as motives, 192.
How grow, 190, 193.
Important, 189.
Influence of, 191.
Nature of, 189.
Sight, qualities given by, 78.
Skin, the sensations from, 79, 80.
Smell, qualities, 79.
Sound, how produced, 75.
Stimuli, appeal to senses by, 70.
Character of, 41.
Effects of sensory, 47.
End organs and, 40.
Syllogism, the, use in reasoning, 156.

Taste, qualities of, 79.
Temperament, classes of, 189.
Predisposes to mood, 188.
Temperature, distribution of end organs of, 80.
Thinking, 143–160.
Affected by interest, 195.
Affected by mood, 186.
Concept in the, 147, 149.
Function of, 144.
Necessity for valid, 117.
Use of imagination in, 132.
Thought, dependence on experience, 90.
Dependence on sensation and perception, 87.
Emotion and, 213.
Touch, sensations from, 80.

Valjean, Jean, illustrating type of decision, 236.
Volition, *see Will.*

Will, 226–245.
Acts in directing attention, 236.
Freedom of, 243.
Highest form of mind, 243.
Interest and, 207.
Nature of, 227.
Will, objective tests of, 237.
Training of, 241.
Types of, 237–241.
Work, play and, 178, 179.
Under incentive of interest, 198, 206.
Worry, evil effects of, 54.

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